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ECONOMIC GEOGRAPHY OF MADHYA PRADESH

(Formerly Central Provinces and Berar)

by

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G.P.	Central Provinces and Berar.
G.W.I.&N.D.	Central Water Irrigation and Navigation Commission.
C.W.P.C.	Central Water and Power Commission.
Comm.Ind.	Commerce and Industry.
Eas.Econ.	The Eastern Economist.
For.Bull.	Forest Bulletin.
Geol.Met.Inst.Ind.	Geology and Meteorological Institute of India.
G.S.I.	Geological Survey of India.
I.C.A.M.	Indian Council of Agricultural Research.
Ind.Farm.	Indian Farming.
Ind.For.	Indian Forester.
Ind.For.Rec.	Indian Forest Records.
Ind.J.Met.Geophy.	Indian Journal of Meteorology and Geophysics.
Ind.J.P.R.V.D.	Indian Journal of Power and River Valley Development.
Ind.J.Stat.	Indian Journal of Statistics.

Abbreviations

Bull.Geol.Soc.Amer.	Bulletin of the Geological Society of America.
Bull.G.S.I.	Bulletin of the Geological Survey of India.
C.B.I.J.	The Central Borad of Irrigation Journal.
C.P.	Central Provinces and Berar.
C.W.I.N.C.	Central Water Irrigation and Navigation Commission.
C.W.P.C.	Central Water and Power Commission.
Comm.Ind.	Commerce and Industry.
Eas.Econ.	The Eastern Economist.
For.Bull.	Forest Bulletin.
Geol.Met.Inst.Ind.	Geology and Meteorological Institute of India.
G.S.I.	Geological Survey of India.
I.C.A.R.	Indian Council of Agriculture Research.
Ind.Farm.	Indian Farming.
Ind.For.	Indian Forester.
Ind.For.Rec.	Indian Forest Records.
Ind.J.Met.Geophy.	Indian Journal of Meteorology and Geophysics.
Ind.J.P.R.V.D.	Indian Journal of Power and River Valley Development.
Ind.J.Stat.	Indian Journal of Statistics.

Ind.Met.Dep.Sc.Notes.	Indian Meteorological Department Scientific Notes.
Ind.Min.	Indian Minerals.
I.S.C.A.	Indian Science Congress Association.
Ind.Stat.Bull.	Indian Statistical Bulletin.
I.T.I.	Indian Trade and Industry.
I.T.J.	Indian Trade Journal.
J.I.R.C.	Journal of the Indian Road Congress.
J.Ind.Tr.	Journal of Industry and Trade.
J.S.W.C.I.	Journal of Soil and Water Conservation in India.
M.P.	Madhya Pradesh.
Maj.Ind.Ind.	Major Industries of India.
Memo.G.S.I.	Memoirs of the Geological Survey of India.
Memo.Ind.Met.Dep.	Memoirs of the Indian Meteorological Department.
Quar.J.G.M.	Quarterly Journal of Geology and Mining.
Quart.J.Geol.Min. Met.Soc.Ind.	Quarterly Journal of Geology, Mining and Meteorology of India.
Rec.G.S.I.	Records of the Geological Survey of India.
Sc.cul.	Science and culture.
Trans-Comm.	Transport-Communication.
Trans.Nat.Inst.Sc.India	Transaction of National Institute of Science.



ALTERED NAMES IN M.P.NEW NAME:OLD NAME:

Amravati

Amraoti

Durg

Drug

Jabalpur

Jubbulpore

Madhya Pradesh

Central Provinces  
and Berar

Narmada

Narbudda or Narbada

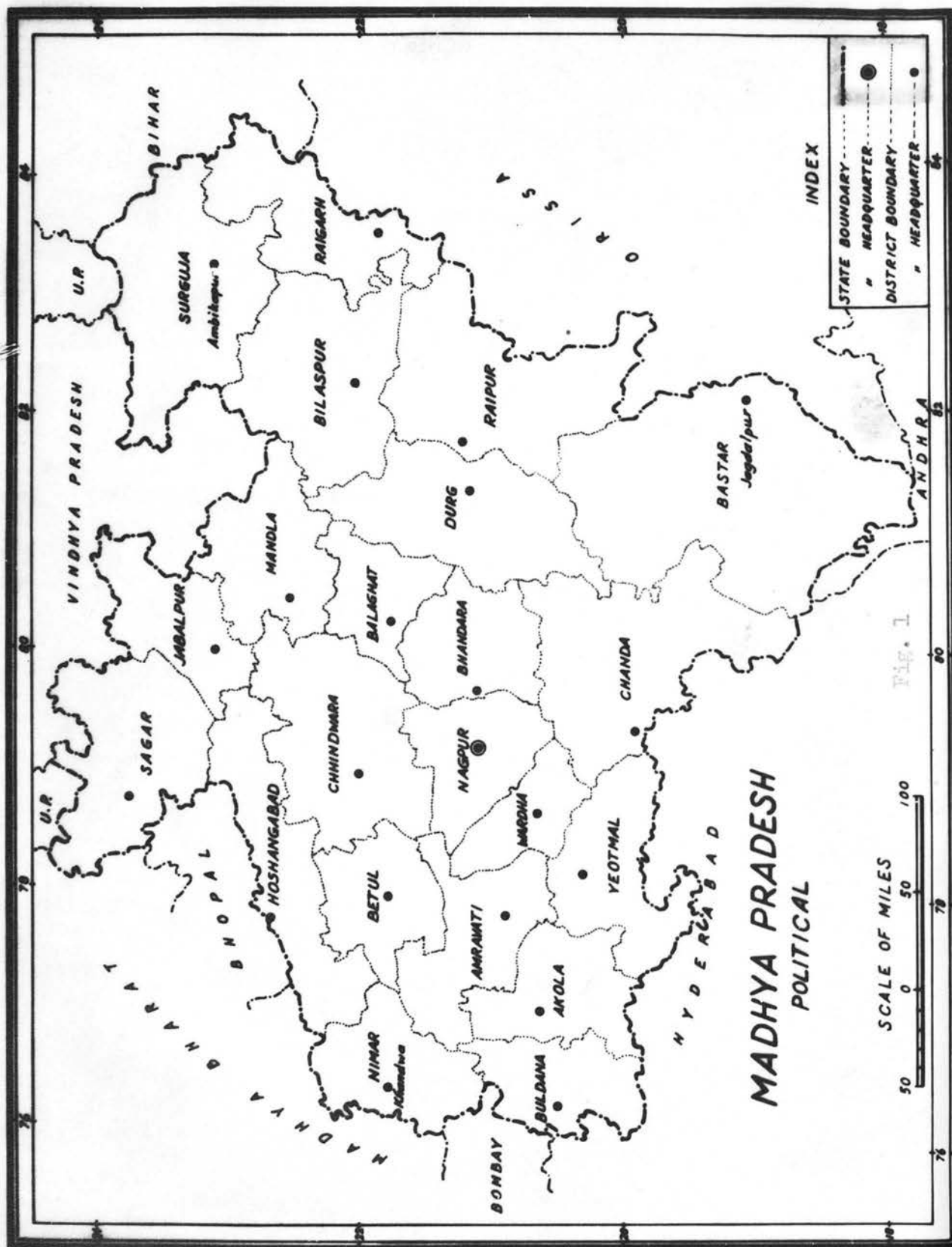
Sagar

Sangor

Tapi

Tapti





## Chapter 1. The Evolution of the State of Madhya Pradesh and its Component Parts

(Fig. 1)

### I The limits and general characteristics.

The State of M.P., covering an area of 83,375 acres and having a population of 21,247,533 persons in 1951, is the first in area and sixth in population in the Indian Union. In area it is larger than the British Isles or Italy and a little smaller than Japan or Germany.

The State is situated between  $17^{\circ}46'52''$  and  $24^{\circ}27'00''$  north latitude and  $75^{\circ}55'24''$  and  $84^{\circ}23'54''$  east longitude. Its maximum length east to west is about 525 miles and north to south about 455 miles. Its shape is more or less rectangular from northwest to southeast. It is bounded on the northwest by the Bhopal State and Madhya Bharat. In the north the Uttar Pradesh touches the boundaries of Madhya Pradesh in two districts - Sagar with Jhansi of U.P. and Surguja with the Mirzapur district. Otherwise in most of the north, the State is bounded by Vindhya Pradesh. On the east are Bihar and Orissa. In the southeast is Madras State. The south is bounded by the Hyderabad State. A portion of the west is bounded by the State of Bombay. Thus 9 different administrations touch this State along its

boundaries. (Fig. 1)

The State can be divided into 3 tracts of upland alternating with two of plains. On the Vindhyan or Malwa plateau lies the Sagar district. The general elevation of the plateau is from 1,500 to 3,000 feet. It is drained by the Sonar which joins the Yamuna (Jumna) in the north. South of this plateau is the Narmada valley with its rich alluvial soil. It lies between the Vindhya and the Satpuras with a length of about 200 miles from east to west and having the average breadth of about 20 miles. South of the Narmada valley there is another tract extending from Armarkantak on the east to Asirgarh in the Nimar district in the west. The greater part of it consists of a plateau with an average height of 2,000 feet. It consists of bare stoney ridges, narrow fertile valleys and rugged hills. The Satpuras are not only the main watershed for the plains of north and south of them but are a dividing line between northern and southern India, climatically and ethnically. In M.P. it forms an "alteration of hill and valley, wood and river, ..." (1). Some of the more important rivers of the State, e.g. Narmada, Tapi, Wardha and the Wainganga rise in these hills. To the east of the Satpuras lies the Makai hill. This ridge merges into the highland of the western part of the Chota Nagpur. To

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(1) The Gazetteer of the Central Provinces, 2nd Edn., Nagpur 187a, p. XVII

the south and east of the Satpuras are the Berar and the Nagpur Plains. These Plains are drained by the Purna, the Wardha and the Wainganga. Beyond them comes the Chhattisgarh Plain. The Berar and Nagpur Plains are important for cotton and the Chhattisgarh for rice growing. There is another expanse of hills and plateau in the Chanda, Chhattisgarh Division, Bastar and Kanker, which covers an area of about 24,000 square miles. The greater part of it consists of dense forests. It is drained by the Indravati and its tributaries and later joins the Godavari. From the economic point of view the Narmada valley is a wheat-growing tract, Berar and Nagpur Plains are cotton-growing, the Chhattisgarh Plain is rice-growing and the Plateaus are predominantly forest.

The State which has grown up in this area, and under these geographical conditions, has had a long and varied history. Since this history, or at least its more recent part, is vital to an appreciation of the problems and opportunities faced by the State, it will be reviewed before an attempt is made at describing the resources and economy of the area.

## II Brief History of Madhya Pradesh.

The recent period leading to the formation of M.P. history starts from the beginning of the 19th century. At

the start of the century the Nagpur kingdom under Raghuji II "included practically the whole of the present Central Provinces and Berar, besides Orissa, and some of Chota Nagpur States." (1) It was known as Nagpur kingdom at its zenith. In 1803, Raghuji II attacked the English and was defeated. Under the Treaty of Deogaon, "Raghuji was obliged to cede Cuttack, Sambalpur, and a part of Berar, and to agree to the permanent appointment of a British Resident at his court." (2) Under the partition treaty of Hyderabad (1804) the Berar Territories ceded by the Bhonsla Raja were made over to the Nizam," (3) and the rest were incorporated in British India. In 1816, Raghuji II died and his son succeeded who was soon murdered by Appa Sahib. Appa Sahib signed a "treaty of alliance for the maintenance of a subsidiary force by the British ....." (4) In 1817 there was another war between the English and the Peshwa in which Appa Sahib helped the Peshwa. This war resulted into the defeat of the Peshwa.

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- (1) Imperial Gazetteer of India, Provincial Series, Central Provinces, Calcutta 1908, p. 18.  
 (2) Ibid., p. 18.  
 (3) Imperial Gazetteer of India, Provincial Series, Berar, Calcutta 1909, p. 12.  
 (4) C.P. Gazetteer, 1908, loc. cit., pp 18 and 19.

So that "the remaining portion of Berar was ceded to the Nizam of Hyderabad and the territories in the Narbada (Narmada) valley to the British" (1) Appa Sahib was deposed and in his place the grandchild of Raghuji II, who was minor, was installed as Raghuji III. During the minority of Raghuji III, the Nagpur territories "were administered by the Resident from 1818-1830..." (2) In 1830, Raghuji III was accredited with full powers. He died in 1853 without an heir and the State "lapsed to the British Government..." (3) It is interesting to note that "in the Nagpur country the Maratha rule lasted from sixty-seven to seventy-seven years, with a second period from the date of Raghuji's majority in 1830 to the British accession in 1854, of twenty-four years. In Sagar and Narbada (Narmada) territories the duration of their power varied from twenty-nine years in Mandla itself to eighty-five years in the northern part of Sagar." (4)

To sum up, in 1817 parts of Sagar and Damoh and in 1818 the remainder along with Mandla, Betul and Seoni and

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- (1) C.P. Gazetteer, 1908, loc. cit., p. 19.
  - (2) Ibid., p. 19.
  - (3) The Cambridge History of India, Vol. VI, Cambridge 1932, p. 75.
  - (4) The Gazetteer of the Central Provinces of India, Nagpur 1870, p. XC.



Narmada valley were incorporated by the English in British India, in what were known as the Sagar and Narmada territories. In 1853 Nagpur State lapsed to the British Government. Thus by 1861 when the Central Provinces were created they included "the Sagar and Narmada territories and the Nagpur State, together with certain other tracts acquired at various times." (1) It is to be noted that Berar was not a part of Central Provinces at the time of the creation of that Province.

Berar had been an independent State for only 90 years in the 16th century when it was ruled by the Imad Shahi princes and their capital was Ellichpur (2). In 1572 Nizam Shah of Ahmadnagar conquered Berar but the Ahmadnagar dynasty was not able to hold Berar long. (3) By 1594 Berar was annexed to the Moghul Empire (4). When the Moghul Empire became weak Marathas on one side and the Nizam of Hyderabad on the other side started to gain control over Berar. Three battles were fought from 1721 to 1724 between Nizamul Mulk and the Marathas on the soils of Berar. Since 1724 "Berar has always been nominally subject to the Hyderabad Dynasty." (5)

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(1) The Cambridge History of India, Vol. VI., op. cit., p. 278.

(2) Gazetteer for the Hyderabad Assigned District, Commonly called Berar, Bombay 1870, p. 116.

(3) Ibid., p. 117.

(4) Ibid., p. 118.

(5) Ibid., p. 122.

There had been continued struggle for territory and revenue between the two governors of Berar, the Maratha and the Moghul. In 1803 when Raghuji II was defeated by the English, under the Treaty of Deogaon Raghuji Bhonsla "resigned all claim to territory and revenue west of the Wardha ..." (1) In 1804, under the partition treaty of Hyderabad, "the whole of Berar, including districts east of Wardha ... was made over in perpetual sovereignty to His Highness the Nizam." (2) In 1853 a Treaty was signed between the Nizam and the British Government "by which the Province of Berar was alienated for the support of the contingent..." (3) Further it was agreed "that the Resident at the Court of Hyderabad for the time being shall always render true and faithful accounts every year to the Nizam of the receipts and disbursement with the said districts, and make over any surplus revenue that may exist to His Highness ..." (4) In 1860 another Treaty was signed between the British government and the Nizam of Hyderabad. It is known as Supplemental Treaty 1860. Under that Treaty

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- (1) Gazetteer for the Haidrabad Assigned Districts, Commonly called Berar, Bombay 1870, p. 125.
  - (2) Ibid., p. 128.
  - (3) East India (Hyderabad) Correspondence (Cmd. 2439), London 1925, p. 29.
  - (4) Ibid., p. 70.



account of Berar would not be demanded by the Nizam but the British Government agreed to pay to the Nizam a surplus, if any (1). Till 1902 Berar was "held by the British Government in trust for the payment of the troops of the Hyderabad contingent ..." (2) According to the Agreement of 1902 Berar was leased "to the British Government in perpetuity in consideration of the payment to him by the British Government of a fixed and perpetual rent of 25 lakhs (2.5 million) of rupees per annum" (3). Further the British Government was allowed "to administer the Assigned Districts (Berar) in such manner as they may deem desirable." (4) Thus in 1903 Berar came under the administration of the Chief Commissioner of the Central Provinces. (5)

In 1861, the Nagpur Province, the Sagar and the Narmada Territories were united to form the Central Provinces. In 1903, Berar was also incorporated in the Province, which became known as the Central Provinces and Berar. These basic portions of what was to become M.P. were rich in agriculture and minerals, and had considerable forest and

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(1) East India (Hyderabad) Correspondence (Cmd. 2439), London 1925, p. 74.

(2) Ibid., p. 74.

(3) Ibid., p. 58.

(4) Ibid., p. 58.

(5) Berar Gazetteer, 1909, op. cit., p. 16.

water resources. As far as agriculture is concerned, they produce wheat, rice, pulses, cotton and oilseeds as important crops. In cotton, pulses and oilseeds production, they are one of the major producers in India. They give M.P. a surplus in foodgrains, which it can export to the neighbouring States. The important mineral deposits are coal, iron ore, manganese, aluminium and limestone, which are of very high order. M.P.'s importance in mineral deposits is next to Bihar. The manganese deposits is of world importance. The best teak forest of India is located in the State.

### III Brief History and description of the Indian States merged with Madhya Pradesh.

Actually 15 Indian States have been merged with Madhya Pradesh. Eleven of them are Feudatory States and the remaining 4 Tributary States. The five States of Udaipur, Jashpur, Surguja, Korea and Changbhakhar were under the control of the Commissioner of Chota Nagpur Division of Bengal from 1854 to 1905. Thereafter they were transferred to the Commissioner of the Chhattisgarh Division of Madhya Pradesh. In 1933 the control of these States along with other States of Chhattisgarh was transferred to the Crown Representative (Viceroy) through the Political Agent, Chhattisgarh States, Raipur and Resident, Eastern States Agency, Calcutta. The only State which had no political

of these tiny forest States can be traced in the pre-British

connection with Madhya Pradesh at the time of its merger, and which has been merged with it is Makrai State. In 1858 it was under the control of the Deputy Commissioner of Hoshangabad who was in charge of it as Political Agent. In 1919 it was put under the control of the Political Agent, Central Provinces Feudatory States, Raipur. In 1933 it was transferred to the Political Agent of Bhopal.

From the description given below it will be seen that these are mostly small and tiny States, 8 States had an area of less than 1,000 sq. miles each (Sakti only 130 miles and Makrai 150), another 5 less than 2,000 sq. miles, only Surguja had 6,055 sq. miles and Bastar, 13,725 sq. miles. Except Makrai, the rest are in rice zone. The main crop of many of them is rice and in some of them kodon; only Makrai has wheat as main crop. Forest predominates in almost all States. Soil is generally of not good quality. The population consists mostly of forest tribes. These States, generally, did not coincide with either relief or natural regions. Each forest tribe developed its principality and since communication was difficult, they remained within a limited area. In forested areas all over India, such small States grew in the past. These States were not the creation of the British Government. They ceded to the British Government in due course of time. The cause of the growth of these tiny forest States can be traced in the pre-Hindu

period. When Aryans invaded India from ~~the~~ Central Asia, they pushed the original inhabitants into forests, inhospitable and inferior lands. The original inhabitants took refuge in such land and in due course of time each tribe occupied a certain area and thus principalities developed.

Ten of these States have been merged in each other to form 3 new districts while the other 5 have been merged in two other districts of the State. The States of Surguja, Korea and Changbhakhar form the new district of Surguja. (1) The States of Raigarh, Sarangarh, Sakti, Udaipur and Jashpur form the new district of Raigarh. (2) The third district is of Bastar which includes the States of Bastar and Kanker. (3) The States of Nandgaon, Khairagarh, Chhuikhadan and Kawardha have been merged with the district of Durg while the Makrai State went in with the Hoshangabad district. (4) The total area is about 31,697 square miles. (5)

1. Udaipur State. This State "was a part of Surguja as an appanage of younger branch." (6) Madhoji/<sup>Bhoṛsla</sup>(Appa Sahib)

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(1) Census of India, 1951, Vol. VII, Madhya Pradesh, Part I - A Report, Nagpur 1953, p.1.

(2) Ibid, p.1.

(3) Ibid, p.1.

(4) Ibid, p.1.

(5) Ibid, p.2.

(6) The Commercial and General Directory of C.P. and Berar, 1938, Khandwa, p.107.

(7) Report on the Annual Administration of the Jashpur State, 1943-44, No Imprint S.D., p.2.

(8) Report of Jashpur, loc. cit. p.1.

ceded the State to the British Government in 1818. (1) It was a Tributary State. The area of the State is 1,045 square miles. (2) The main river is the Mand which joins the Mahanadi in the Raigarh district. The river is not navigable within the State as there are rapids and pools. (3) The minerals found in the State are coal, gold, iron, mica, laterite and limestone. (4) It is claimed that there are rich deposits of minerals in the State "but no proper investigation has been made so far." (5) The cropped area is 205,362 acres. Rice is the staple food grain. The greater portion of the State is covered with forests. The important trees are sal (*shorea robusta*), mahua (*Bassia latefolia*), Kusum (*Schleichera trijuga*), and tendu (*Diospyrus melanoxylon*). (6)

2. Jashpur State. The State of Jashpur was "a feudatory State of Bhonslas of Nagpur." (7) This State along with the States of Surguja, Udaipur, Korea and Changbhakhar was ceded to the British Government in 1818. (8) It was a Tributary State. The area of the State is 1,923 square miles. (9) The

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- (1) Report on the Administration of the Udaipur State for the year 1945-46, Monghyr 1946, p.2.  
 (2) Ibid, p.1.  
 (3) C.P. Gazetteer 1908, op. cit., 479.  
 (4) Ibid, p.479.  
 (5) C.P. Directory, op. cit., p.107.  
 (6) Report, loc. cit., p.5.  
 (7) C.P. Directory, op. cit., p.81  
 (8) Report on the Annual Administration of the Jashpur State, 1943-44, No Imprint n.d., p.2.  
 (9) Report of Jashpur, loc. cit., p.1.

State has equal proportion of highland and lowland with the highest peak of Ranijula which is 3,527 ft. high. The Ib is the main river which flows from north to south within the State. There are several waterfalls and therefore the river is not navigable. (1) Others are only hill streams. The only mineral is iron "in a nodular form in the hilly tracts..." (2) The forest products are Sal, Sissu, and ebony among the trees. Other products are lac, tasar silk, beeswax, sabai grass, edible roots and indigenous drugs. The agricultural produce are paddy, sugarcane and garden crops.

3. Surguja State. This State is a Feudatory State. As regards area it is the second largest State in the Eastern States Agency with an area of 6,055 square miles. (3) It is a secluded basin surrounded by hills and rivers. The chief rivers are the Kanhar, Rehar and the Mahan that take the northerly course towards the Son. The other river is the Sankh which goes to southern direction to join the Brahmani. The rivers are not navigable. Once the neighbouring States of Udaipur, Jashpur, Korea and Changbhakhar were ruled by the Chief of the Surguja State (4). In 1818 it was ceded

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(1) C.P. Gazetteer, op.cit., p.470.

(2) Ibid, p.470.

(3) Surguja State Administration Report for 1945-46, Ranchi, n.d., p.1.

(4) C.P. Directory, op.cit., p.80.



to the British Government by Appa Sahib. The principal crops are rice, wheat, barley, oats, maize, gondli and kodan. Besides the above, gram and other pulses, oilseeds, cotton, san-hemp and flax are also grown. (1) The State exports rice, wheat and grain to other States. (2) The State has 61 per cent of her total land area under forest. (3) Teak for railway sleepers, bamboo, katha, lac, sabai grass, tendu leaves and gums are the products of the forests. (4) The only mineral of importance in the State is coal and "It has been estimated that the coal measures of the Bistrampur field occupy an area of about 400 square miles, but no systematic prospecting has been done." (5) In fact, up to 1938 no boring was carried out. (6) Exploitation has now begun. Other minerals exploited are mica and bauxite. (7) Lead is a probability if geological survey is made, as "Traces of lead are found." (8)

4. Korea State. It was a Tributary State with an area of 1,647 square miles. (9) The State claims that Changbhakhar had been a part of this State which was separated from it in

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- (1) C.P. Gazetteer 1908, op.cit., p.475.
  - (2) Surguja Administration Report, loc.cit., p.32.
  - (3) Ibid, p.38.
  - (4) Ibid, pp.39 and 40.
  - (5) C.P. Gazetteer 1908, op.cit., p.475.
  - (6) C.P. Directory, 1938, op.cit., p.80-A.
  - (7) Surguja State Administration Report, op.cit., p.32.
  - (8) C.P. Gazetteer, 1908, op.cit., p.475.
  - (9) Annual Administration Report of the Korea State for 1945-46, Baikunthpur 1946, p.1.

1848 (1). The State was ceded to the British Government in 1818. The State is an elevated table-land of coarse sandstone. On this tableland are several scarped plateaus which are irregularly distributed. One of the plateaus, Sonhat plateau, is the watershed of rivers. These rivers flow into 3 different directions - on the west they flow to join the Gopath, on the northeast to the Son and on the south to the Hasdo. It "is a deficit area in respect of food grains." (2) But it contains extensive valuable forests. The most important forest produce are sal (*shorea robusta*) and bamboos. Among the minor products are lac, khair (*Acacia Catechu*), several drugs and edible roots. Forests also possess good pasturage. The State possesses large deposits of coal which are being worked. Mica, iron ores, limestone and certain types of clays are also found but they need further exploration. (3) The Chief of the State "has no right to the produces of gold, silver, diamond, or coal mines in the State or to any minerals underground, which are the property of the British Government." (4) Of the minerals, iron ore is well-distributed "but mineral rights belong to the British Government." (5)

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- (1) Annual Administration Report of the Korea State for 1945-46, Baikunthpur 1946, p.2.  
 (2) Ibid, p.40.  
 (3) Ibid, p.44.  
 (4) C.P. Gazetteer 1908, op.cit., pp.483 and 484.  
 (5) Ibid, p.483.



5. Changbhakhar State. It was a Tributary State with an area of 906 square miles. (1) The State is full of hills, ravines, and plateaus with extensive sal forests. The rivers are the Banas, Bapti and Neur. The Banas and the Neur pass through rocky beds and rapids and are only hill streams. Formerly it was a dependency of Korea State and "in 1848 it was separately settled." (2) The State was ceded to the British Government in 1818 along with Korea. Out of a total area of 906 square miles, 770 square miles, or about 85%, is under forest. (3) The major products of these forests are timber and bamboos. The minor products are harra, awala, bahera, tendu leaf, mahua seeds, medicinal herbs, thatching grass, gum, lac, katha, honey, wax and wild animals. (4) Rice is the main staple crop of the State.

6. Bastar State. This Feudatory State with an area of 13,725 square miles was "the twelfth largest State in the Indian Empire..." (5) The central and northwestern part of the State is very mountainous while about two-third of the east there is plateau with an elevation of about 2,000 feet above sea level. The main river is the Indravati which

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- (1) Annual Administration Report. Changbhakhar State for 1945-46, Raipur n.d., p.1.  
 (2) C.P. Gazetteer 1908, op.cit., p.485.  
 (3) Administration Report, Changbhakbar, loc.cit., p.13.  
 (4) Ibid, pp.15 and 16.  
 (5) Report on the Administration of Bastar State for 1944, Jagdalpur 1945, p.1.

passes through the centre of the State in east to west direction and divides the State into two parts. The Indravati makes a waterfall at Chitrakot which is 94 feet high. (1) The other rivers of importance are the Sabrai and the Tel. Since 1777 the State used to pay yearly tribute to the Bhonslas of Nagpur and when Nagpur State lapsed to the British Government in 1854, this State too came under the British Government. (2) Most of the State is covered with jungle which includes sal and teak. (3) In the southwest there is a considerable quantity of teak with bijasal mixed, while in the northeast sal replaces teak. Bamboos are confined entirely to the hills. (4) Of the total area of the State, three-fourths are forest or grass land. Among the minor products of the forests are myrabolams, lac, wax, honey, hides and horns, tanning and dyeing barks, tasar silk cocoons, etc. There are extensive and rich deposits of iron ore. Mica is also found in several places. (5) The soil is well adapted for rice cultivation but requires a good supply of water. Rice is <sup>by</sup> far the most important crop. Other crops are small millet, pulses and gram.

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(1) C.P. Gazetteer 1908, op.cit., p.449.

(2) Report of Bastar State, loc.cit., p.1.

(3) Ibid, p.1.

(4) C.P. Gazetteer 1908, op.cit., 450.

(5) Ibid, p.452.

(5) The Gazetteer of the C.P., 1870, op.cit., p.346.

7. Kanker State. The Kanker State had been a Feudatory State with an area of 1,430 square miles. (1) The Kanker State was held under the Marathas till 1809 when it was taken back by the Raja of Nagpur. In 1818 it was restored by the British Resident at Nagpur. (2) Hill and forest cover most of the area of the State. It is only in the eastern portion that there is extensive tract of plain land, along the valley of the Mahanadi. The only river of importance is the Mahanadi which flows through the eastern part of the State. The main forest trees are teak, sal, sersa, and bijasal. The agricultural produce according to importance are rice and Kodon.

8. Nandgaon State. It was in 1865 that it became a Feudatory State of the British Government. (3) The total area of the State is 871 square miles. (4) It is "a fertile tract of country." (5) The two tracts of Patta and Pandadeh in the north have high hills and dense forests while in the south the Dongargaon tract is mainly of broken ground with low peaks. The Nandgaon and Mohgaon tracts are open black soil plain and are of very great fertility. There are two

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(1) Kanker State Administration Report for 1945-46, Ranchi, n.d., p.1.

(2) Ibid, p.3.

(3) C.P. Gazetteer, op.cit., p.456.

(4) Nandgaon State Administration Report 1943-44, Raj-Nandgaon, n.d., p.1.

(5) The Gazetteer of the C.P., 1870, op.cit., p.346.

rivers flowing in the State - the Seonath in the southern portion and the Bagh in the west. One-sixth of the total area of the State is under forest but of inferior quality. (1) Timber, firewood and charcoal, bamboos, grass, lac, harra, mahua, kosa, and tendu leaves are the forest products. (2) Rich dark soil covers the greater part of the cultivated land. The main crops grown are rice, kodon, rahar, cotton, till, wheat, gram, peas, masur, and linseed. (3) The importance of mines and quarries can be gauged from the fact that previously they were under the Revenue Department of the State and then transferred to Forest Department. Then the total income from this source was only Rs 2,084/ (£156.6s) in the year 1943-44. (4) Iron ore and limestone are found in the State. (5) There is a spinning and weaving mill at Rajnandgaon (capital of the State). (6)

9. Khairagarh State. It was a Feudatory State and the area was 931 square miles. (7) The western part of the State is hilly while the eastern is a level black soil plain of great fertility. In 1853 it came under the British

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- (1) C.P. Gazetteer 1908, op.cit., p.456.  
 (2) Nandgaon State Report, op.cit., pp.21 and 22.  
 (3) Ibid, p.20.  
 (4) Ibid, p.22.  
 (5) C.P. Gazetteer 1908, op.cit., p.456.  
 (6) Nandgaon State Report, op.cit., p.456, 12.  
 (7) Khairagarh Administration Report 1945-46, Nagpur, n.d. p.1.

Government on the lapse of the Nagpur State as Khairagarh was a tributary of it. The soil of the eastern part is fertile black while that of the western is light and sandy. Further expansion of cultivable land is not possible. (1) The chief crops are kodon, wheat and rice. The State possesses rich forests of timber, bamboos, firewood, etc. (2) The State claims that it "is rich in mineral resources. (3) Red and yellow ochre, bauxite, small quantities of iron and some other minerals are found in the State. The most important mineral found in the State is fluorspar. This mineral is found only in this State and the adjoining State of Nandgaon in the whole of India. (4) But no exploitation has yet taken place.

10. Chhuikhadan State. The Feudatory State of Chhuikhadan with an area of 153 square miles "is a fertile cultivated plain." (5) In 1780, the Raja of Nagpur recognized the chief of this State as zamindar (landlord). In 1853 it passed to the British Government and in 1865 the British Government gave it the status of a Feudatory State. (6) Rice, wheat, gram, linseed and kodon are the main crops grown

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- (1) Khairagarh Administration Report 1945-46, Nagpur, n.d., p.11.  
 (2) Ibid, p.41.  
 (3) Ibid, p.44.  
 (4) Ibid, p.44.  
 (5) C.P. Gazetteer 1908, op.cit., p.460.  
 (6) Chhuikhadan State Administration Report for 1945-46, Raipur, n.d., p.1.

in the State. The State possesses a large area of fertile black soil and more than 75% of the total area is under cultivation. The area under forest is 17 square miles and the main forest products are timber, firewood, bamboos, grass, etc. (1)

11. Kawardha State. It was a Feudatory State. Its area is 805 square miles. (2) The State consists of hill and forests in the western half and an open plain in the eastern half. In the open plain of the eastern half there is considerable quantity of good black soil. Raghuji Bhonsla gave it for military service and passed to the British Government in 1853 along with the Nagpur State. Out of a total area of 805 square miles, 456 square miles are under forests (3) Timber, firewood and charcoal, bamboos, grass are the main products besides minor products. (4) The principal crops according to the area under cultivation are kodon-rahara, paddy, wheat, masoor, gram, linseed, batana, and sugarcane. (5) The State is rich in mineral resources such as iron ore, red and yellow ochre, mica, soap-stone, limestone and clays of different kinds. (6) High grade

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(1) Chhuikhadan State Report, op.cit., pp. 15 and 16.

(2) Kawardha State Administration Report 1945-46, Nagpur, n.d., p.1.

(3) Ibid, p.42.

(4) Ibid, p.43.

(5) Ibid, p.10.

(6) Ibid, p.52.



iron ore containing 95% of iron is found in the State. (1)

12. Sarangarh State. The area of this Feudatory State is 540 square miles. (2) It is a plain level country but for the chain of hills which run from north to south through the centre and another which extends along the southern border. The State possesses generally light and sandy soil of inferior quality. (3) In 1737, the founder of the ruling dynasty was recognised as Raja by the Nagpur State. In 1804 the State accepted the supremacy of the British Government. In 1806 the British Government ceded back this right to Nagpur but finally it was transferred to the British Government in 1818. (4) Rice, Kudo, urad, til, wheat and gram are the principal food crops of the State. (5) The main forest products are bamboos, timber, harra, bahera, lac and tendu leaves. (6) The State is poor in mineral resources and only in two or three localities some iron ore is found but that too in small quantities. (7)

13. Raigarh State. The Feudatory State of Raigarh had an area of 1,486 square miles. (8) Physically the

(1) Kawardha State Report, op. cit., P.53

(2) Administration Report of Sarangarh State for 1945-46, Jharsuguda n.d. p.1.

(3) C.P. Gazetteer 1908, op. cit., p.468

(4) Administration Report of Sarangarh State, loc. cit. p.3.

(5) Ibid., p.23.

(6) Ibid., p.24.

(7) C.P. Gazetteer, op. cit., p.468.

(8) Raigarh Administration Report, 1945-56, Jharsuguda, n.d. p.1.



State can be divided into two parts - northern and southern. The northern part is almost hilly with forest while the southern is an open plain. The elevation is 2,245 ft. in the north and decreases towards the south where it is 773 feet. The Mahanadi river is the natural boundary between the States of Raigarh and Sarangarh. The other two rivers of the State are the Mand and Kelo which are the tributaries of the Mahanadi. These rivers provide good facilities for irrigation. (1) Over most part of the State there is yellow rice land of Chhattisgarh. Towards the Bilaspur border is found black soil in small quantities. The most important crop is rice followed by til and kodon. About 443 square miles are under forest. The ~~most~~ important trees are sal, saja and bija. (2) The State claims that it "has deposits of coal, mica, iron ore, limestone, dolomite and different kinds of clays. The mineral wealth of the State has not yet been exploited for want of a proper geological survey." (2) These deposits are mainly in the northern part of the State which is hilly and rocky. At present there are two coal fields under operation. (3)

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(1) Raigarh Administration Report, op. cit., p.2.

(2) Ibid., p.3.

(3) Ibid., p.45.

(4) Ibid., p.22.

(5) Ibid., p.24.

(6) Administration Report of the Mahul State for the year 1944-45. (Typed Report in the India House Library, High Commissioner's Office, London), p.3.

14. Sakti State. This was a Feudatory State having an area of 130 square miles. (1) It is an open tract which extends from the hill range in the north up to the Railway line. There are a few patches of the forests at the base of the hill. There are no rivers except a few hill streams which often go dry during dry season. Mostly the soil is loam. Formerly it was tributary to the Maharaja of Sambalpur. (2) The forest area in the State is very small. The predominant species are saj and sal. The other species of less value are dhaura, lendia, mundhu. Teak is conspicuous by its absence while bamboos are of very poor quality. (3) Rice is the predominant crop followed by kodon and urad. There are no minerals in the State except limestone and dolomite. Two quarries of limestone are being worked at present. (4)

15. Makrai State. It was a Feudatory State with an area of 150 square miles. (5) Some part of the State lies in the open valley of the Narmada, but the greater part on the lower slopes of the Satpuras with low hills covered with forest. It came under British protection in 1844. In

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- (1) Administration Report of Sakti State for 1945-46, Jharsuguda n.d. p.1.  
 (2) Ibid., p.2.  
 (3) Ibid., p.22.  
 (4) Ibid., p.24.  
 (5) Administration Report of the Makrai State for the year 1944-45. (Typed Report in the India House Library, High Commissioner's Office, London), p.3.

1858 it was put under the control of the Deputy Commissioner of Hoshangabad in his capacity as Political Agent. In 1919 it was transferred to the Political Agent Central Provinces Feudatory States, Raipur. In 1933 it had gone to the charge of the Political Agent in Bhopal. (1) Now it is a part of the Hoshangabad district of Madhya Pradesh. The low hills are covered with forest. The principal trees are saj and tinsa. The staple crop of the State is wheat. Other crops are jowar, cotton and gram, but of less importance.

Till 1950 these Princely States were under the political jurisdiction of the Central Provinces and Berar but were independent internally for administrative purposes. In 1950 they were incorporated in a new State now known as Madhya Pradesh State. This includes the old Central Provinces and Berar, fourteen Indian States attached to the old Province and one attached to the Political Agent, Bhopal.

#### IV The States Reorganisation Commission and the creation of new state of Madhya Pradesh.

The demand for reorganisation of the provinces of India is an old one - not a Post-Independence creation. "It is a direct outcome of the phenomenal development of regional languages in the nineteenth century which led to an

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(1) Administration Report of the Makrai State for the year 1944-45., op. cit., p.1.

emotional integration of different language groups and the development amongst them of a consciousness of being distinct cultural units. (1) (This is the opinion of the States Reorganisation Commission, but is open to question. Though an excuse it is probably not the cause. The real cause has been economic rather than linguistic.) However, whenever such a demand was made it was in the name of "distinct cultural units". For one reason or other, the provinces constituted during the Moghul and British periods were based on the consideration of strategy and administrative convenience. Thus during the British period in the beginning Sind was attached with Bombay Presidency and Orissa with Bihar. Bombay was more advanced educationally and economically, as was Bihar compared with Orissa. Hence, the demand of separation of Sind from Bombay and Orissa from Bihar. These demands were conceded in 1935 under the India Act 1935. These are not only two isolated cases. Several of less magnitude can be cited. Anyhow, there arose the demand for linguistically homogenous units since the beginning of the present century. The first reference to the linguistic principle is found in the correspondence between the Governments of India and

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(1) Report of The States Reorganisation Commission, 1955, (S.R.C.) Delhi, 1955, p.10.

Bengal in 1903 in connection with the partition of Bengal.(1)  
 In 1911, "language was again prominently mentioned" by Lord Hardinge in his despatch to the Secretary of State for India recommending the annulment of the partition of Bengal.(2)  
 The Montagu-Chelmsford Report of 1918 gave "a strong argument in favour of linguistic or racial units of government..." (3)  
 In 1930 the Indian Statutory Commission "gave only qualified support to the linguistic principle. It attached great importance to agreement amongst the people affected by the changes." (4)

In 1905, the Indian National Congress supported this principle indirectly when it supported the demand of unification of Bengal on the ground that both units were Bengali-speaking people. (5) Further support for the linguistic principle came from the Congress when in 1908 it created a separate congress province of Bihar and in 1917 Congress provinces of Sind and Andhra. (6) But in the All India Congress session of 1917 the principle of linguistic provinces "was strongly opposed by the group led by Dr. Annie

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- (1) Report of The States Reorganisation Commission, op.cit.,  
 (2) Ibid., p.10. p.10.  
 (3) Ibid., p.11.  
 (4) Ibid., p.12.  
 (5) Ibid., pp. 12 and 13.  
 (6) Ibid., p.13.

(7) Ibid., pp. 13 and 14.

(8) Ibid., p.14.

Besant." (1) In 1920, at its Nagpur session, the Congress "accepted the linguistic redistribution as a clear political objective and in the following year the principle was adopted for the purposes of its own organisation." (2) In 1928, the Nehru Committee of the All-Parties Conference "recommended that the redistribution of the provinces should take place on the basis of the wishes of the population, language and geographical, economic and financial principles".(3) During the period between 1928 and 1947 (before independence) the Congress reaffirmed its promise for linguistic provinces - in 1937 at the Calcutta Session of the Congress, in 1938 by the Working Committee of the Congress at Wardha and in the manifesto of the 1946 general election.

The States Reorganisation Commission observes that "There was a perceptible change, however, in the outlook of the Congress leaders on the subject with Partition and the achievement of Independence." (4) In November 1947, soon after Independence, the Prime Minister (Pandit Jawahar Lal Nehru) in the Indian Constituent Assembly conceded the linguistic principle but said: "First things must come first and the first thing is the security and stability of

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(1) S.R.C., op. cit., p.13.

(2) Ibid., p.13.

(3) Ibid., pp. 13 and 14.

(4) Ibid., p.14.



India."(1) It is difficult to understand how "the security and stability of India" would have been endangered by the creation of linguistic provinces, if it was a right demand on principle.

A Linguistic Provinces Commission (known as Dar Commission) was set up by the Government of India on the recommendation of the Drafting Committee of the Constituent Assembly. It submitted its Report in December 1948. The Dar Commission "not only expressed itself strongly against any reorganisation being undertaken in the prevailing circumstances but also held that the formation of provinces exclusively or even mainly on linguistic considerations would be inadvisable." (2) Further the Commission was of the opinion "that in forming provinces the emphasis should be primarily on administrative convenience. The homogeneity of language should enter into consideration only as a matter of administrative convenience."(3)

At the Jaipur Session of the All India Congress in 1948, a Committee was set up "to consider the question of linguistic provinces and to review the position in the light of the report of the Dar Commission and the new problems

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(1) S.R.C., op. cit., p.14.

(2) Ibid., p.15.

(3) Ibid., p.15. cit., p.16.

(4) Ibid., p.16.

(5) Ibid., p.17.



that have arisen since Independence." (1) It is known as the J.V.P. Committee as it consisted of Jawahar Lal Nehru (Prime Minister of India), Sardar Valabhai Patel (then Deputy Prime Minister and now deceased) and Dr. B. Pattabhi Sitaramayya (a veteran Congress leader and until recently Governor of Madhya Pradesh.) The Committee observed:

"(a) When the Congress had given the seal of its approval to the general principle of linguistic provinces it was not faced with the practical application of the principle and hence it had not considered all the implications and consequences that arose from this practical application;

"(b) the primary consideration must be the security, unity and economic prosperity of India and every separatist and disruptive tendency should be rigorously discouraged;

"(c) language was not only a binding force but also a separating one; and

"(d) the old Congress policy of having linguistic provinces could only be applied after careful thought had been given to each separate case and without creating serious administrative dislocation or mutual conflicts which would jeopardise the political and economic stability of the country." (2)

The Congress in its election manifesto of 1951 stated that "the reorganisation of States would ultimately depend on the wishes of the people concerned but expressed the opinion that, while linguistic reasons were important, there were other factors also, such as economic, administrative and financial considerations, which had to be taken into account." (3)

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(1) S.R.C., op. cit., p.16.

(2) Ibid., p.16.

(3) Ibid., p.17.

In January 1953, May 1953 and January 1954, the Congress did not give priority to the principle of linguistic provinces but emphasised "the unity of India and national security..." (1)

In 1952, one Potti Sriramulu of Andhra decided to fast unto death unless Andhra was created a separate State from Madras State. On his death the Government of India decided to establish the State of Andhra. (2) The State of Andhra came into existence on the 1st of October, 1953. (3)

The public opinion was so overwhelmingly in favour of linguistic states that the Government of India had to appoint the States Reorganisation Commission (known as Fazle Ali Commission) in December 1953. When the Fazle Ali Commission started functioning the problem again came before the public "with opinion divided on the appropriateness of the time for taking large-scale changes in the existing set-up." (4) There was also a suggestion for "the postponement of the whole issue for a period of at least twenty or twenty-five years to allow for the creation of a proper atmosphere in the country..." (5) Under the terms of reference the

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(1) S.R.C., op. cit., p.17.

(2) Ibid., p.18.

(3) Times of India Directory and Year Book, 1956-57, Bombay n.d. p.281.

(4) S.R.C. op. cit., p.22.

(5) Ibid., p.23.

Commission had not only to consider the language and culture in the reorganisation of the States but also other important factors to be borne in mind. (1)

It will be seen from the above how the Congress High Command shifted grounds from time to time. The Congress when it was in opposition exploited the sentiments of the people by endorsing the demand for linguistic provinces and criticised the British Government for the creation of Provinces on the ground of strategy and administrative convenience. But after Independence when Congress formed the Government it backed out from its old promise of linguistic provinces. It is evident from the J.V.P. Committee Report, of which the Prime Minister was the Chairman, that the Government was giving primary consideration to economic viability, security and unity, etc., and not to language. At last the States Reorganisation Commission came into existence in December 1953. When the Commission started functioning, no one knew what would be the shape of things to come. A barrage of claims and counter-claims was put before the Commission by various States and public organisations. Every State attempted to get the maximum from other States on one or other excuse and at the same time tried not to lose any part of her own territory. In

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(1) S.R.C., op. cit., p.264.

connection with the formation of the new state of Madhya Pradesh, the Commission observed that "The suggestions made to this Commission regarding the exact extent of this State have been various and conflicting." (1) Maha Vidarbha claimed "the Maratha-speaking portions of the Nimar, Betul, Chhindwara, Balaghat, and Bastar district." (2) This was <sup>and</sup> over/above the eight Maratha-speaking districts of Buldana, Akola, Amravati, Yeotmal, Wardha, Nagpur, Bhandara and Chanda. Another claim was that the four northern districts of Madhya Bharat could not be included in the new Madhya Pradesh. (3) Rajasthan claimed a certain portion of Madhya Bharat. (4) New Madhya Pradesh wanted certain parts of Rajasthan. (5) The Andhra State wanted the southern part of the Bastar district. (6) Orissa also wanted a certain portion of Bastar. (7) Besides these claims and counterclaims, even if the States Reorganisation Commission had to reorganise the States purely on linguistic grounds, the fate of the Hindi-speaking area of India was hanging in the balance. There could not be any safe

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(1) S.R.C., op. cit., p.129.

(2) Ibid., p.129

(3) Ibid., p.123.

(4) Ibid., p.129.

(5) Ibid., p.129,

(6) Ibid., p.130.

(7) Ibid., p.132.

speculation regarding the area and boundary of various Hindi-speaking States. The Hindi-speaking area, with different dialects, includes Bihar, Uttar Pradesh, Delhi, eastern districts of the Punjab, Madhya Pradesh excluding the southern districts of Berar, Nagpur, Wardha, Bhandara and Chanda. It was not certain how different States would be carved out. When the Commission's Report was published there were demonstrations, protest meetings at various places and even riots in some places regarding the recommendations of the Commission.

Tracing the history of the formation of the Central Province, the Commission observed that it was "the result of accident and circumstances that, in 1861, when the Central Province was formed, Hindi-speaking territories of Narmada and Sagar were joined with the Marathi-speaking territory of the Raja of Nagpur." (1)

In Madhya Pradesh the demand was "for the separation of the Marathi-speaking districts of the present State of Madhya Pradesh." (2) The Commission "recommended, therefore, that a new state should be formed in this area consisting of the following Marathi-speaking districts, namely Buldana, Akola, Amravati, Yeotmal, Wardha, Nagpur, Bhandara

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(1) S.R.C., op. cit., p.122.

(2) Ibid., p.122.



and Chanda." (1) The Commission did not propose to break up the existing districts of Nimar, Betul, Chhindwara and Balaghat to the north and Bastar to the east in order to recognise the claims made on behalf of Vidarbha mainly on linguistic grounds." (2) As far as the new State of Madhya Pradesh is concerned, the Commission recommended that "it should include the following areas, namely,

- "(i) the 14 districts of residuary Madhya Pradesh,
- "(ii) the whole of Bhopal,
- "(iii) the whole of Vindhya Pradesh,
- "(iv) Madhya Bharat except the Sunel enclave of the Mandsaur district, and
- "(v) The Sironj subdivision of the Kotah district of Rajasthan." (3)

Jabalpur was recommended to be the capital of the new state. (4) It is a compact area of Hindi-speaking people with an area of about 171,200 square miles and a population of 26.1 millions.

The recommendations of the States Reorganisation Commission were not accepted in toto by the Government of India. Under the States Reorganisation Act, 1956 (No. 37 of 1956) which came into force on the 1st of November 1956, the new State of Madhya Pradesh came to comprise the fourteen Hindi-speaking districts of old Madhya Pradesh (Mahakoshal),

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(1) S.R.C., op. cit., p.125.  
 (2) Ibid., p.125.  
 (3) Ibid., p.132.  
 (4) Ibid., p.132.

Vindhya Pradesh, Madhya Bharat, Bhopal and the Sironj subdivision. The Sironj subdivision of Kotah district in the State of Rajasthan was to become part of Bhilsa district of old Madhya Bharat. (1) Bhopal was made capital of the new state against the recommendation of the Commission for Jabalpur. The recommendation of the Commission for the creation of a new State of Vidarbha, comprising the eight Marathi-speaking districts of Buldana, Akola, Amravati, Yeotmal, Wardha, Nagpur, Bhandara and Chanda of the old Madhya Pradesh State, was not accepted. They have been carved out from the old Madhya Pradesh and amalgamated with the State of Bombay. (2)

#### IV The Administrative Geography of Madhya Pradesh.

Ethnically the State can be divided into two parts with the Satpuras as the dividing line. The Sagar and Narmada Territories belong to Bundelkhand stock while the old Nagpur Province and Berar are dominated by the Marathi-speaking tribes from the Deccan. Sironcha and parts of Chanda are under the influence of Telinga. In the central belt of the central plateau these two races meet, each having their distinct characteristics. There is a distinct

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- (1) States Reorganisation Act 1956 (No. 37 of 1956)  
Delhi 1956, Section 9, p. 6.  
(2) Ibid., Section 8, p. 5.

(1) G.P. Gazetteer 1970, sp. cit., pp. cxxxiii and cxxxiv.  
(2) G.P. Directory 1938, sp. cit., p. 49.



physical basis for their separation in the Satpuras, which form the dividing line between the north and the south. Above this line is the plateau area and the Satpura and Vindhyan ranges cover the region. In between the Satpuras and Vindhyas flows the Narmada. South of this line lie all the three plains of the State - Berar, Nagpur and Chhattisgarh. The comparative study of the climate of the plateau districts and of plain districts has been made in detail under the section on climate. Here it is sufficient to point out that the plateau districts are colder and the plain districts hotter. Further, the rainfall is greater over the plateau regions than over the adjacent areas of the plain region. Such differences in environment expressed themselves ethnographically and culturally.

Hindi is the regional language of the north while the majority of the Marathi-speaking people are found in Berar, Wardha, Nagpur, Chanda and Bhandara. In the beginning when "the Bhonsla Kingdom was broken up, the experiment was tried of attaching these disjecta membra of different nationalities to their parent stocks." (1) In 1820 the Narmada and Sagar Territories were put under the administration of an Agent to the Governor-General. (2) In 1835, when the Northwest Provinces was constituted these

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(1) C.P. Gazetteer 1870, op. cit., pp.cxxxiii and cxxxiv.

(2) C.P. Directory 1938, op. cit., p.49.

territories were included in it. In 1842, consequent to the Bundela rising disturbances, they were again put back under an Agent to the Governor-General. This arrangement did not prove satisfactory and once more the territories were included in the North-West Province in 1853. (1) During the minority of Raghuji III, from 1818 to 1830, the Nagpur Territory was administered by a Resident. In 1853, on the death of Raghuji III, the State lapsed to the British Government and the Resident was transformed into a Commissioner under the Government of India. This administration included besides the Nagpur Division, Chhattisgarh, and Chhindwara. In 1861, Lord Canning, then Governor-General of India, decided to unite these three territories (Narmada, Sagar and Nagpur) to form the Central Provinces as they were "too remote from the headquarters of any Local Government to be efficiently administered..." (2) Up to 1919 the Head of the Province was Chief Commissioner. On the introduction of Montagu-Chelmsford reforms, the Head of the Province became Governor instead of Chief Commissioner. Till 1903, Berar was under the administration of a commissioner who was responsible to the Resident at Hyderabad. After the Agreement of 1902, between His Exalted Highness the Nizam of Hyderabad and the British Government, Berar was united

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(1) C.P. Gazetteer 1908, op. cit., p.19.

(2) Ibid., p.20.

with the Central Provinces to form the same administration in 1903.

#### V Administrative Divisions.

In 1901, there were eighteen districts in the Central Provinces (minus Berar) under four Commissioners' Divisions, namely,

1. Jabalpur Division - Sagar, Damoh, Jabalpur, Mandla and Seoni;
2. Narmada Division - Narsinghpur, Hoshangabad, Nimar, Betul and Chhindwara;
3. Nagpur Division - Wardha, Nagpur, Chanda, Bhandara and Balaghat; and
4. Chhattisgarh Division - Raipur, Bilaspur and Sambalpur. (1)

In 1903, Berar was amalgamated with the Central Provinces to form the Central Provinces and form with the same administrative divisions - six districts under two Divisional Commissioners of East and West Berar. The amalgamation of Berar with the Central Provinces was exclusively in consideration of administrative convenience, though the southern portion of the C.P. constituted the part of Berar and in the past was known as Vidarbha (Vidarbha consisted of Berar and the districts of Wardha, Nagpur, Chanda and Bhandara). When the British Government took over the administration of Berar, they decided to attach it with the

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(1) Census of India 1901, Vol. XIII, Part I Report, C.P., Nagpur 1902, p.27.

Central Provinces as it was the only British administrative unit bordering Berar (except a small part with East Khandesh of Bombay Presidency) and Berar was too small to form an independent unit. In the beginning of the 19th century Berar was part of the Nagpur Kingdom. Vidarbha has the same physical features, climate and predominant black cotton soil. In 1905, the Berar districts were reduced to four by readjustment of the districts under one Divisional Commissioner of Berar Division. Ellichpur merged with Amravati, part of Basim into Akola and the remaining part of Basim and Wun formed a new district of Yeotmal. Thus in 1905 the re-arranged districts under the Divisional Commissioner of Berar were Amravati, Akola, Buldana and Yeotmal. (1) In all there were twenty-two districts under five Divisional Commissioners in 1905.

In 1905 Sambalpur was transferred to Bengal. In 1906 the Durg district was created from parts of Raipur and Bilaspur. Thus at the time of the census of 1911 the number of districts remained the same - twenty-two in all under five Divisional Commissioners. (2)

At the end of 1931, the Narmada Division was abolished and Damoh was amalgamated with Sagar, Narsinghpur with

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- (1) Census of India 1911, Vol. X, Part I Report, Central Provinces and Berar, Calcutta 1912, p.3.  
 (2) Ibid., p.3.

Hoshangabad and Seoni with Chhindwara. (1) The rearranged districts (nineteen districts) with their Divisions were,

1. Jabalpur Division - Jabalpur, Sagar (with Damoh), Hoshangabad (with Narsinghpur), Mandla, and Nimar;
2. Chhattisgarh Division - Raipur, Bilaspur, Durg, Bhandara and Balaghat;
3. Nagpur Division - Nagpur, Wardha, Chanda, Chhindwara (with Seoni) and Betul; and
4. Berar Division - Amravati, Akola, Buldana and Yeotmal. (2)

The next change in the administrative division was made in 1948. The Commissioners' Divisions were abolished with effect from the 1st of November 1948 and the posts of Commissioners were retrenched. The administration came under the control of the State Government through the Deputy Commissioners of the districts. (3) The other event of importance in connection with the administrative division was (3) the "unification of the Princely order with the people of India". This resulted in the creation of three new districts and the merging of other States with the neighbouring districts as mentioned earlier. (4)

Hence, the districts at the time of the Census of 1951 were twenty-two in all, i.e. Sagar, Jabalpur, Hoshangabad,

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- (1) Census of India 1931, Vol. XII, Part I Report, C.P. & Berar, Nagpur 1933, p.1.
  - (2) Ibid, p.2.
  - (3) Census of India 1951, Madhya Pradesh, op. cit., pp. 1 & 2.
  - (4) Ibid, p.1.



Nimar, Mandla, Betul, Chhindwara, Raipur, Bilaspur, Durg, Bastar, Raigarh, Surguja, Chanda, Bhandara, Balaghat, Wardha, Nagpur, Amravati, Akola, Buldana and Yeotmal.

## VI Brief Economic History of the State

It is not possible to make an economic survey of the State correctly as no comprehensive economic survey has ever been attempted. The only source of information lies in the various Census Reports of the State. But a comparative study can be attempted from these Reports. The Census Report of 1891 says: "Comparison with the returns of 1881 is impossible." (1) The 1951 Census says: "Detailed comparison of the occupational figures of the 1931 Census with those of the 1951 data is not practicable on account of the change in the method of classification." (2) Further it says that "the figures of non-earning dependents are not available for the 1931 Census." (3) Pointing out changes in the classification, the Report of 1951 says: "The principal change involved in the 1951 classification of economic activities as compared to the 1931 Census is the setting up of a comprehensive economic classification of the people as a whole and not merely of those who are engaged in gainful occupation." (4) In spite of these

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(1) C.P. Census, 1891, op. cit., p.223.

(2) M.P. Census, 1951, op. cit.; p. 56.

(3) Ibid, p.56.

(4) Ibid, p.56.

handicaps an attempt will be made to give a clear picture.

Perhaps one might begin with some extracts from the speech of His Royal Highness the Prince of Wales on the occasion of his visit at Nagpur on the 30th of January, 1922.

"It is only 60 years that this Province has been formed. Before the formation of this Province many tracts which are included in this were unknown and in a very backward state. Some part of the Province no king ever ruled and it was segregated from other Provinces. Neither were there roads nor railways in those times ... The travellers and pilgrims after their return stated that there were extensive forests resided in by aboriginal tribes living in extreme poverty. The people lived on agriculture only. So they had to suffer from famine very often... That the Province possesses mineral wealth is evident from coal landed up to the Nerbada river and thence exported on boats...

"There is a marked change in the condition of your Province now. Railways and Roads are constructed and so it has started communication with other provinces in the country... The land under cultivation has risen from one crore 80 lakh (18 million) acres to 2 crores 90 lakhs (29 million) acres ... The Province is famous for its cotton which is woven into cloth in the Mills of Nagpur, Bombay, Manchester, etc. The forests which were unproductive yield more than 21 lakhs (2.1 million) of income from sleepers, grass, lac and other products. Minerals in the Province have not been properly investigated, still eighteen coal mines yielding 5 lakh (500,000) tons of coal annually are working. Forty-six manganese mines are yielding 6 lakh (600,000) tons of ore. From the lime stone of the Province such cement as can compete with that of Portland can be prepared. Many mills, factories and industries are started in the province and thousands of men are supported by them." (1)

How far the statement that the agriculture was the only means of livelihood previous to the British period was correct

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(1) C.P. Directory 1938, op. cit., pp. 73 and 75.



can be judged from the Census Report. The State was constituted as a Province in 1861 and the first census was taken in 1866. The second census took place in 1872 - only after 6 years. The Census Report of 1872 says: "The people live chiefly by agriculture, and the number of this class are increasing rather than diminishing since the weaving and spinning trades have become so much less profitable than they used to be. Persons formerly employed in weaving and spinning have now become agriculturists or agricultural or general labourers." (1) The above remarks of the Report show that the State was not merely agricultural but there were industries also. In 1891, people employed in Pasture and Agriculture were 66.51% and in Industrial Occupation 18.70%. The 1901 Census Report says that there was "a great decrease in the village industries, and a small increase in the proportion of agricultural labourers." (2) Further it says that "The number of persons employed in the industries of cotton-weaving and dyeing, pottery, and working in leather have all decreased largely." (3) Regarding the Cotton industry the Report says that it "has undergone a very large decline since last Census..." (4) In 1911, 76% of the population was

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(1) C.P. Census 1872, op. cit., p.42.

(2) C.P. Census 1901, op. cit., p.211.

(3) Ibid, p.211.

(4) Ibid, p.225.

dependent upon agriculture and 10% on industries (1). Comparing the general distribution of population with that of 1901, the Census Report of 1911 remarks that "there has been an increase in the proportion of the population engaged in Pasture and Agriculture... , a decrease in the number occupied in textile industries, an increase in the leather manufacture and trades and in domestic service and the liberal professions, ... " (2) A comparative study for the occupational figures of the 1921, 1931 and 1951 Census has been made in the Census Report of 1951. In 1941, owing to the War, the figures were not published and therefore no study for that Census can be made. The Report of 1951 says that "Detailed Comparison of the occupational figures of the 1931 census with those of 1951 data is not practicable on account of the change in the method of classification... For the 1921 and the 1951 Censuses, however, full details for the entire population are available and ... the percentage of the actual population belonging to the different livelihood classes is also given." (3) The table below gives the comparative figures employed under different livelihood classes at the time of the Censuses of 1921, 1931 and 1951. (4)

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(1) C.P. and Berar Census 1911, op. cit., p.244.

(2) Ibid, p.244.

(3) M.P. Census Report 1951, op. cit. p. 56.

(4) Ibid, p.56.

Table No. 1

Comparison of livelihood Classification  
at 1921, 1931 and 1951 Censuses

Livelihood Class	Percentage of self-supporting persons and earning dependents to the total number of all self-supporting and earning dependents in the State.		Actual percentage of population depending on different livelihood class	
	1931	1951	1921	1951
Agriculture	77.7	80.4	74.0	76.0
Industry	10.4	9.6	12.7	10.6
Commerce	3.9	3.0	4.5	4.4
Transport	0.6	1.0	1.1	1.5
Other Services	7.4	6.0	7.7	7.5

It is evident from the above table that the dependence on agriculture has been progressively increasing and the number of people engaged in industry, commerce and other service decreasing. Only in transport has the number been increasing. Commenting on the situation the 1951 Census Report observes that "the industries in our State have not continued to absorb our increasing population even to the extent of the proportion which existed in 1921 and 1931 and the pressure on agriculture is increasing. Miscellaneous

sources of livelihood have also failed to absorb proportionate share of the increasing population seems to be clear." (1)

From the above Survey it is clear that the persons employed in Agriculture in 1891 was 66.51% which increased to 76% in 1951 and in industries it decreased from 18.7% in 1891 to 10.6% in 1951.

The State of Madhya Pradesh is third among the major states of the Indian Union as far as the percentage of population depending upon agriculture is concerned. It is fourth for people depending upon production other than cultivation is concerned. It is to be noted that "Production (other than cultivation) includes also stock raising, rearing of small animals and insects, plantation industries, forestry and woodcutting, hunting and fishing." (2) Due to the inclusion of the above things in this livelihood class Assam tops the list and not the industrially more developed States of Bombay, Bengal or Madras. The table overleaf gives the livelihood pattern of Madhya Pradesh compared with some of the major States of the Indian Union. (3)

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(1) M.P. Census Report, 1951, op. cit., p. 56.

(2) Ibid, p.53.

(3) Ibid, p.57.

Table No. 2.

Livelihood pattern of Madhya Pradesh and some of the Major States of the Indian Union.

State	Percentage of population mainly dependent on Agriculture	Production (other than cultivation)
Bihar	86.05	3.94
Orissa	79.29	6.33
Madhya Pradesh	76.00	10.60
Uttar Pradesh	74.19	8.38
Assam	73.34	14.68
Madras	64.90	12.40
Punjab	64.52	7.32
Bombay	61.46	13.76

From the economic survey made in this thesis it is quite clear that Madhya Pradesh has high potential resources in its cash crop (cotton/)<sup>and oilseeds</sup> and its grain crops (wheat,<sup>and pulses</sup> and rice/), its forests and minerals, and that the State can be developed economically to a greater extent. Before the discussion is closed it seems desirable to quote a few sentences from the Gazetteer of the Central Provinces of India, published in 1870. It says that "Chanda ... with her rare combination of coal, iron, and cotton, promises to become one

of the chief industrial centres of India." (1) This was the hope expressed 85 years ago, but the day promised still awaits to be seen. Describing the economic condition the Gazetteer says: "Within less than ten years the conditions of life to the mass of the people have undergone a complete revolution. The food-grains which were once so plentiful, that in good seasons farmers could hardly get labour to carry their harvests, are now jealously stored for export, and meted out at what would have been thought famine prices. The cotton of the Nagpur plain (Berar was not included at that time in this State), which was worked up by thousands of village looms into a fabric so durable as to make its cost a matter of secondary importance, and yet so cheap as to be within the reach of all, is now eagerly bought up to be packed by steam-presses, and sent across the seas to England, to France, to Germany, and even to Russia. In short, food has trebled and clothing has doubled in price within the last ten years; and a life of rude plenty and implicit dependence on the bounty of nature has been perforce exchanged for a constant exercise of foresight and prudence."

This is an indication of another trend in the economy of Madhya Pradesh - the fact that it has been caught up

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(1) The Gazetteer of the C.P. 1870, op. cit., pp. cliv and clv.



into the larger economy of India and of the world. As indicated this meant at first an export of its surplus food and raw materials where M.P. became a contributor of primary products to the great manufacturing centres and consumer markets of Europe. While such a situation still continues M.P. is beginning to develop more of its resources for its own use and may in the future process some of these and export secondary as well as primary products in the world market. Thus it will become more self-reliant, it will be more closely integrated with the rest of India, and it will have more to offer to the world at large.

Statistics. Before discussing the various problems of M.P., a word needs to be said about statistics which are neither accurate nor reliable to bring home the limitation under which one is to deal with the planning of the State. There are many defects in agricultural statistics which have been pointed out by the F.A.O. Census Committee (April 1949). (1) The statistics of crop "are more guesses and not infrequently, demonstrably absurd guesses." (2) Besides, "the accuracy and completeness of

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(1) Indian Farming, Vol. XI No. 1, January 1950, op. cit, p.48.

(2) Royal Commission on Agriculture in India, Report, op. cit., 1928, p.605.

the statistics are still influenced by administrative considerations." (1) The Central Minister for Food and Agriculture also made adverse comments on the reliability of the data supplied by the potwaris (petty village official) at the convocation of the Indian Council of Agricultural Research in September 1950.

The central Food and Agriculture Minister said that "It had been often observed that figures given by Food Department were different from those given by the Agriculture Department on the same subject." (2)

Sbate says that "the agricultural statistics are reliable enough for regional or crop comparison, and as evidence of trend, and otherwise it is sufficient to bear in mind that they are indices rather than absolute statement." (3)

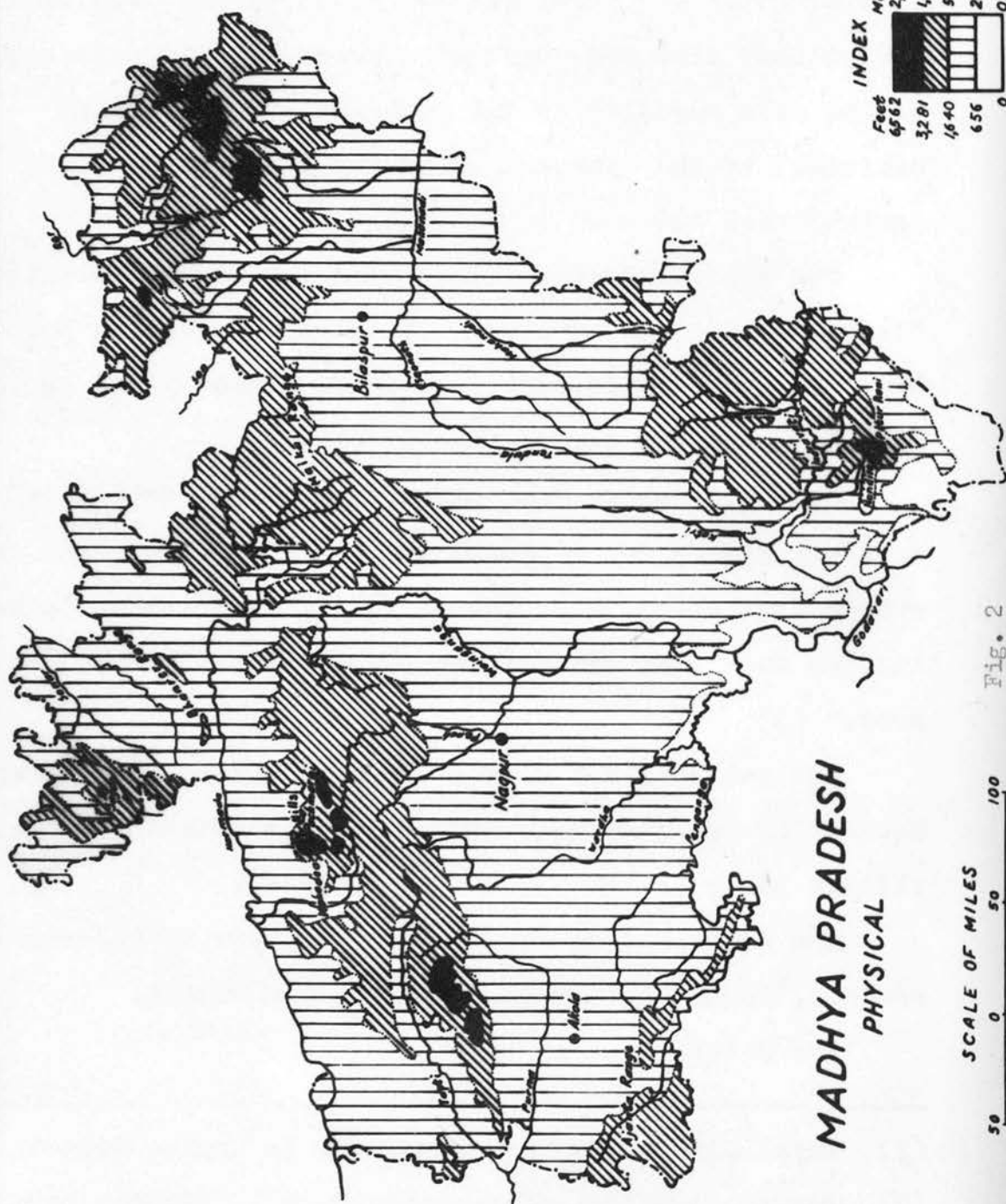
The geographical area of M.P. according to the Surveyor General of India is much greater than the area according to village paper (State Revenue Department).

The same is true in case of estimates of mineral resources, forest resources and livestock census.

For details see Appendix I.

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- (1) Royal Commission on Agriculture in India, Report op. cit., 1928, p.600.
  - (2) Towards Land Transformation, Part II (Agricultural Extension Seminar), Delhi 1952, p.1.
  - (3) Sbate, O.H.K. India and Pakistan, London, 1954, p.201.





## Chapter II - Physical Features

### Section A. Geology

(Figs. 2 and 3)

Madhya Pradesh is a part of Peninsular India. As such, it has been a land area which has never been submerged beneath the sea since Cambrian times, except for a temporary period - but that too was confined locally. (1) Thus there are no deposits of marine sediments of any considerable extent later than Cambrian. (2) Another peculiarity of M.P. is that its originally horizontal strata were not greatly displaced by lateral thrusts and mountain building forces even when elevated. A third fact is that "the mountains are mostly of the 'relict' type", ibid. They are not fold mountains, but consist of "outstanding portions of the old plateau of the Peninsula that have escaped, for one reason or another, the weathering of ages that has cut out all the surrounding parts of the land ... " (3)

Mountain Ranges. The principal mountain ranges of the State are the Vindhya and the Satpuras. (Fig. 2)

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(1) Wadia, D.N. - Geology of India, 2nd Edn, London, 1939, p.2.

(2) Ibid, p.2.

(3) Ibid, p.2.

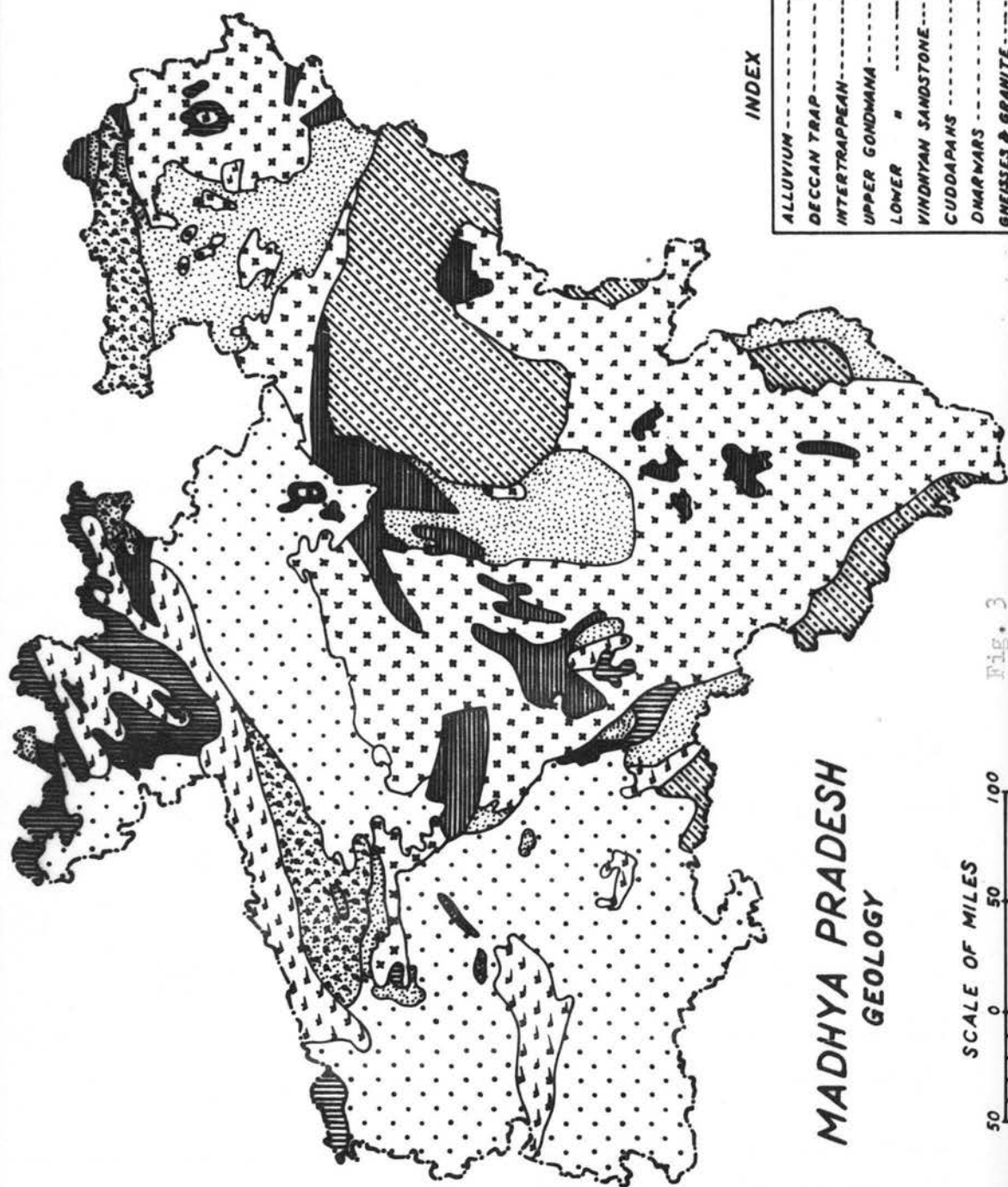


Fig. 3

(a) The Vindhyas. The Vindhya are not a range of hills in the proper geological sense of the term, as they do not possess a definite axis of elevation or lie along anticlinal or synclinal ridges.(1) Subaereal denudation is responsible for the features of the Vindhya. The hills constitute a dividing line which has been left un-denuded between different drainage areas. On the east the Vindhya continue as the Kaimur Hills which extend through U.P. to Bihar. The general elevation is not high, ranging from 1,500 to 2,000 ft. There are few peaks above 3,000 ft.

The Vindhya along with the Satpuras act as a watershed for the centre of India and they are the sources of the Chambal, Betwa, Sonar, Dhasan, Ken and other rivers of less importance.

Economically the Vindhya are of considerable value. For centuries sandstone has been used as excellent building material. Limestone is also found in some quantity. Manganese, iron and asbestos are found in various parts of the range. The hills are covered with stunted forest growth. Teak is found in patches but is of small size, and poor in valuable timbers.

(b) The Satpuras. As the name indicates they consist of many parallel ridges. They lie to the south of the

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(1) Imperial Gazetteer of India, Central Provinces, Calcutta 1908, p.136.



Vindhya. The Satpuras are formed of bedded flows of basalt in the west and the east. Central to them is a core of granitoid and metamorphic rocks overlain by Mesozoic sandstones.

Both the Vindhya and the Satpuras together form the backbone of the middle India.

The Satpuras are covered with forest which extends over some thousands of square miles. Unrestricted felling, and shifting cultivation adopted by the aboriginal tribes, are responsible for low economic value of the forest. The most valuable forests are those of Sal (*Shorea robusta*) on the eastern hills, and teak on the west.

Plains. The greater part of the relief of M.P. consists of lowlands, either in the form of gentle basins or of valleys. The chief lowlands are Nagpur Plain, Chhattisgarh Plain and Berar Plain. (Fig. 2)

(a) Nagpur Plain. The Nagpur Plain is divided by a rocky barrier from the Chhattisgarh Plain. The Plain covers an area of about 24,127 sq. miles. The western portion consists of low volcanic hill, having deep black soil. The eastern portion is of metamorphic formation. The Plain can be divided into 2 well defined parts; Wardha, Nagpur and the northwest portion of Chanda constitute one part while Bhandara, Balaghat and the rest of Chanda the other. The first is the region of essentially dry crops, cotton

and wheat being important. The second is mainly a rice producing region. Wardha is situated in the valley of the Wardha; Balaghat and Bhandara in the Wainganga; Nagpur between these two rivers; and Chanda at the junction of these rivers which, forming the Pranhita, later join the Godawari. The mean maximum temperature in December at Nagpur is  $81.7^{\circ}\text{F}$  and in May  $108.7^{\circ}\text{F}$ , while the mean maximum in May is  $108.7^{\circ}\text{F}$  and mean minimum  $82.7^{\circ}\text{F}$ . The average annual rainfall is 49".

(b) Chhattisgarh Plain. This lies between the Markal and Orissa hills. On the north is the Satpura range while on the east and south is a vast area of hills and forests. It is drained by the Upper Mahanadi. It is an undulating plain which is intersected by many streams and is conspicuous for tanks. The heart of the plain is covered with Cuddapah rocks. The Plain is 80 to 100 miles wide. The mean maximum temperature during December at Raipur is  $80.0^{\circ}\text{F}$  and during May  $107.3^{\circ}\text{F}$ , while the mean minimum for December is  $54.5^{\circ}\text{F}$  and for May  $82.1^{\circ}\text{F}$ . The average annual rainfall is 50". Rice and linseed are the major crops of the Plain.

(c) Berar Plain. This is bounded on the north by the Gawilgarh hills, and on the south by the Ajan range. On the west the elevation is about 800 feet which rises to 1,200 feet on the east. The best land of Berar is covered

by this Plain. The soil is deep rich black alluvial soil (regar). The soil is extremely fertile. During dry season, the scenery is monotonous. There are few trees in the Plain and these too far between. There are barren tracts in places with round stones and scrub jungles. The Plain is drained by the Purna. The mean maximum temperature during December at Akola is  $84.7^{\circ}\text{F}$  and in May  $108.2^{\circ}\text{F}$  and the mean minimum during December  $53.3^{\circ}\text{F}$  and  $81.3^{\circ}\text{F}$ . The average annual rainfall is 32". The main crop is cotton.

Lake. There is only one lake in the whole of State. It lies in the district of Buldana and is known as Lonar Lake. It is a shallow lake with a diameter of one mile, a depth of 300 feet below the level of the surrounding area. It is "a deep crater-like hollow or basin." The Lake contains sodium carbonate and some sodium chloride. The "salts are thought to have been derived from the surrounding trap country by the chemical solution of the disintegrated product of the traps and subsequent concentration." (1)

There are two views regarding the origin of the Lake. One view is that it is due "to a volcanic explosion unaccompanied by any lava eruption ... On this view the lake-hollow is an explosion-crater or a caldera." (2)

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(1) Wadia, op.cit., p.23.

(2) Ibid, p.23.

Another view is that it is "due to an engulfment or subsidence produced by the sinking of the surface between a circular fracture or fractures, into a cavern emptied by the escape of lava or volcanic vapours into the surrounding place." (1)

At present not much use is made of the economic importance of the salt deposits, except that some salt is exploited by crude methods and is used in crude forms.

### The Chief Geological Formations and their distribution. (Fig.3)

The geological formations encountered in the State may be arranged in order of increasing antiquity as under:- (2)

Alluvium           (Newer  
                      (Older

Laterite

Deccan Trap with Inter-trappeans

Gondwana           (Upper Gondwana  
                      (Lower Gondwana

Purana             (Upper Vindhyan  
                      (Lower Vindhyan (with ? Sullavai series)  
                      (Cuddapah (including the Bijawars and the  
                                  Penganga series)

Archaean           (Pegmatites, granite, gneissose granites and  
                      ( basic intrusives  
                      (Schistose  
                      (Dharwarian formations - including Sausar  
                                  series, Sakoli Series, Chelpi Ghat series,  
                                  Sonakhan beds, Sonawani series, etc.

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(1) Wadia, op.cit., p.23.

(2) Krishnan, M.S. - Mineral Resources of C.P. and Berar,  
Rec. G.S.I. Vol. 74, Part 3, 1939, Calcutta 1939, p.386.

The Archaean Group. At the bottom of the stratified deposits have been found Archaean rocks. They serve as the foundations of the ancient plateau of Peninsular India. Since, in the greater part of the State, it is difficult to distinguish the members of the Dharwar system from the surrounding gneisses, they have been treated together in the paragraphs which follow. (1)

General Trends. The Archaean rocks stretch across M.P. in three contiguous belts from east to west. The middle belt has a wedge-like form towards the east; towards the west it broadens and eventually it disappears beneath the Deccan Trap near Sausar and Nagpur. In general the rocks of the middle belt are more highly metamorphosed. The eastern end of this belt, however, is much less severely metamorphosed than the western. The facies of rocks in the northern belt is much the same as the southern belt in which lie the Sakoli beds. The nature of the boundary between the middle and the southern belt is not perfectly clear. Formerly, from the juxtaposition of two belts showing such different grades of metamorphism - meso-metamorphism to the north and epi-metamorphism to the south - suggests some relative movement along the boundary. (2) Appearances

(1) Pascoe, Sir E.H. - A Manual of the Geology of India and Burma, Vol. I, 3rd Edn, Calcutta 1950, p.160.

(2) Ibid, p.164.

suggest, however, that the Sakoli beds which lie in the southern belt represent a higher portion of the Dharwar succession than the Sausar rocks which occupy the western portion of the middle belt. It is also suggested that the former have been thrust northwards or northwestwards over the latter along an overturned and fractured synclinalorium. The same relationship can be expressed if we suppose that the Sausars have been thrust southwards or southeastwards beneath the Sakolis. (1)

The average direction of the Archaean fold axis in northern parts of the State is E-W or ENE-WSW which is also the trend of the main orographical feature of the Satpura range which forms the watershed between the Narmada and Son drainage on the north and Godawari and Mahanadi in the south. In the southern part the fold axis veers towards NNE-SSW and N-S and in Chanda and Bastar lies parallel to the Godawari basin with a NW-SE trend.

Regional Distribution. The Archaean succession may be described in the following regional groups. (1) Bilaspur - Balaghat, (2) Nagpur - Bhandara, (3) Nagpur - Chhindwara, (4) Sambalpur, (5) Raipur - Durg, (6) Jeypore - Bastar - Chanda, and (7) Jabalpur.

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(1) Pascoe, op.cit., p.164.



1. Bilaspur - Balaghat Region. The middle belt of the Archaean rocks begins skirting the northern and north-western corner of the Chhattisgarh Purana basin. The Dharwars are confined mostly to Bilaspur and Balaghat districts but trespass into Mandla. Westwards they extend and widen into the Maikal range where they are interrupted by an outlying patch of Deccan Trap. Beyond, they are represented by two parallel WSW'ly branches uniting near Bhandara and then diverging again. The more southerly of these branches turns SSW and points towards the large separate Bhandara outcrop which forms part of the southern Sakoli belt. The larger and more northerly branch keeps on its course and points towards a large outcrop underlying the towns of Ramtek and Deolapar (Sausar series).

It has been mentioned that the rocks north and north-west of the Chhattisgarh Purana basin constitute the Chilpi Ghat beds. The Chilpis roughly strike NE - SW. These beds are composed of quartzites, felspathic grits, shales and slates with inter-calcatious of trap. The basal conglomerate contain pebbles of probably older sedimentary rocks. The more northerly of the two branches of the Dharwar outcrop forms a synclinal strip. (1) The Chilpi Ghat series is separated from the overlying

Sausar series (1)

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(1) Krishnan, M.S. - Geology of India and Burma, Madras 1949, p.116.

Cuddapahs by a well marked unconformity. It is continuous southwards with another group of Dharwar rocks which enters the southern bed (Sakoli belt) to which it mostly belongs. The Chilpis are underlain by composite gneisses, mica-schists, quartzites, epidotic gneisses, hornblende-schists, etc., which represent older rocks intruded into and shredded out by younger granites.

Another group of Dharwian rocks in northern Balaghat which has been styled the Sonawani series, is supposed to be older than the Chilpis. The rock types met with in ascending order are cal-gneiss and crystalline limestone with manganese-ore, quartz-muscovite-schists, felspathic quartzites, and phyllitic schists and quartz-muscovite-schists.

The three groups of granite rocks in this region are: oldest, fine-grained schistose biotite-gneisses; the next, streaky augen-gneiss; and the youngest, Amla granite. Thus the general succession of the rocks of this region are.

Granite

Porphyritic and augen gneiss

Schistose biotite-gneiss

Chilpi Ghat series

Sonawani series (1)

2. Nagpur-Bhandara Region. The SSW'ly branch of the Chiplis and the separate Bhandara outcrop (towards which the former points), together form the southern belt of the Archaeans, designated as the Sakoli series. This series of rocks occupies parts of Nagpur and Bhandara districts, extending southwards into Chanda. The general strike varies not greatly from NE-SW. The Sakolis are parallel to the Sausar to the north, the tract separating the two being covered by alluvium, in which small exposures of Sausar occur. The mutual relations between the two are not certain.(1) It is likely that the Sakolis may be an upward continuation of the Sausars, the intermediate country occupying a synclino-rum with a zone of faulting along the axial region, the boundary between the two being drawn in a more or less NE-SW direction.

The Sakolis contain chlorite and sericite schists, and quartzites, haematitic iron ore of a low grade of metamorphism, felspathic muscovite quartz-schists with lenticles of vein quartz with wolfram. In contrast the Sausar series contains calc-granulites, marbles, garnetiferous schists and manganese silicates. The Sakolis were succeeded by intrusions now represented by tourmaline-muscovite granite and pegmatite and quartz-dolerite. (2)

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(1) Krishnan, op.cit., p.118.

(2) Ibid, p.118.

3. Nagpur - Chhindwara Region. In the middle belt of the Archaeans, as one passes from the Chilpi Ghat area to the west, calcareous rocks gain prominence, while schists of higher grade take the place of phyllites. Here it is difficult to separate the original sediments from the igneous material. It is not possible to correlate the rocks of the two tracts due to the difference in the border metamorphic and lithological facies. (1)

The predominant rocks in the Sausar tract succeed each other from dolomitic marble, through hornblende schists, to garnetiferous schists. An open flat syncline in the neighbourhood of Nagpur district also shows a similar succession. (2)

There are three series of orthogneisses younger than the Sausars, namely:-

3. Later granite and pegmatite, including the Amla granite
2. Streaky gneisses derived by the intrusion of aplitic materials into (1) and Schistose Sausars.
1. Granodioritic biolite-gneisses, porphyritic and augen gneisses. (3)

The relationship between the Sausars and Chilpi is

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(1) Krishnan, op.cit., p.119.

(2) Ibid, pp.119 and 120.

(3) Ibid, p.120.

very indistinct. Krishnan regards the Chilpis "as either younger than the Sausar series or as a lateral variation of facies." (1) Fermor opines that "the Chilpis may represent the upper portion of the Sausars and may even include beds higher in sequence than any found in the latter." (2)

4. Sambalpur Region. This lies on the eastern border of Chhattisgarh Purana basin. Here are found biotite - and hornblende-gneisses, schists and granites. The Sambalpur town is on a ridge of quartzite and quartz-schist.

In the Sonakhan hills, situated to the west and north of the Sambalpur area, there is a group of rocks typical of the region known as the Sonakhan bed. They flank the eastern border of the Chhattisgarh Purna basin. To the north they pass under the Cuddapahs. They are steeply dipping and highly crushed. They comprise soft clay slates, argillites, hornstone, and felsites with bands of conglomerate and boulder beds and subordinate bands of quartz - magnetite schist, interbedded traps, hornblende-schists, and intrusive basic dyke of a comparatively late age. Intruding the schistose members are prophyretic granite. They are overlain by the cuddapahs.

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(1) Krishnan, op.cit., p.120.

(2) Ibid, p.120.

5. Raipur - Durg Region. Granites occupy the large tract to the south and southwest of the Cuddapah basin of Raipur. The adjoining parts of the Kankar and Bastar contain Dharwarian rocks. The rock types comprise quartzites, phyllites, mica-schists and banded haematite-quartzites. The strikes of foliation is NW-SE. In the Durg district the main rocks are overlain by volcanic agglomerates and epidiorites or are intruded by granites.

6. Jeypore - Bastar - Chanda Region. The eastern and southern parts of the State are occupied by Archaeans in which the Dharwarian strike persists. A large part here is covered by Cuddapahs. The southern portion of the region is covered by gneissic granites, mica-schists, quartz-schists, hornblende-schists and other type. The eastern part of Chanda and the western part of Bastar and Khair<sup>a</sup>garh are occupied by granites also. From eastern Bastar to Sambalpur the area is occupied by granites, banded and foliated gneisses, and mica-hornblende and talc-schists. Sedimentary rocks are also present. They have been described by Crookshank and Ghosh.(1)

7. Jabalpur Region. The rocks in the Jabalpur region comprise phyllites, mica-schists, calcitic and dolomitic marbles, banded ferruginous rocks associated with manganese

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(1) Krishnan, op.cit., p.114.



and iron ores with altered basic sills. According to the investigation of Prof. Henry Louis and P. N. Ghosh, the iron-ore and manganiiferous iron-ore are not of high grade but are responsible for a local indigenous industry. (1) The schistose rocks are traversed by veins containing copper ores in the neighbourhood of Sleemanabad. They have some similarity to the Byawar series. On the whole the assemblage bears a close similarity to the Dharwars of Chota Nagpur and Gangpur.

It is obvious from this brief survey that the Archaean rocks, and particularly those of the Dharwar group, are some of the most important in M.P. They include deposits of manganese, iron ore, red ochre, limestones, marble and dolomite. Gneiss and granite afford good building stone. Pegmatitic and other mineral veins cutting Archaean formations give rise to ores of gold, copper, silver, lead and wolfram and to commercial quantities of mica and fluorspar.

The Purana Group. According to Pascoe "Purana is necessarily a somewhat vague though most convenient term, applicable to those deposits laid down after the great Eparchaeon terrestrial period and before the Cambrian." (2)

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(1) Krishnan, op.cit. p.130.

(2) Pascoe, op.cit., p.38.

They include the major part of the so-called Transition System, as described in the early days of Indian Geology. The Cuddapah and Vindhyan systems have been grouped together under this group by Holland.

The following mineral deposits are found in the geological formations of the Purana group:- (1)

Vindhyan - Vindhyan Beds. The Vindhyan system is a

Upper - Sandstone, limestone, lithographic stone, manganese ore, lead ore.

Lower - Limestone, fuller's earth, shale, sandstone, diamonds.

Bijawar - Limestone, sandstone, jasper, iron ore, lead ore, silver.

Cuddapah - Limestone, lithographic stone, sandstone, lead ore.

1. The Cuddapah Beds. The Cuddapahs form patches in the Jeypore - Bastar region and occupy a large area in the Chhattisgarh. In the former region they overlies gneissic rock and comprise quartzites, limestones, phyllites and shales. In the Chhattisgarh area the rock comprise a lower arenaceous division and in upper limestone and shale division. Rocks similar to Cuddapahs occur in to the west of the Wardha Valley Coalfield.

Another series, known as the Bijawar, outcrops from Madhya Bharat to the south of the Narmada. The basal beds,

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(1) Krishnan, Rec. G.S.I. Vol. 74, Pt. 3, 1939, op.cit., p.389.

which rest on gneisses, are composed of quartzites and sandstones, and are sometimes conglomeratic. With the quartzites are found siliceous limestones and hornstone-breccia. Ferruginous sandstones, with pockets of hematite, overlie them. Associated with the Bijawaras are lavas, tuffs, sills and dykes of basic composition.

2. The Vindhyan Beds. The Vindhyan system is a vast stratified formation of sandstones, shales and limestones. It underlies the dividing ridge between Hindustan proper and the Deccan, known as the Vindhyan mountains.

There are no metalliferous deposits in the Vindhyan system, but rich resources of building materials occur, such as durable freestones, flagstones, ornamental stones and large quantities of limestone for the manufacture of lime and cement.

In the Godawari Valley the Sullavai series consisting of slates, quartzites, sandstones and conglomerates represent the Vindhyan in Madhya Pradesh. Near Sullavai and in the Dewalmari hills they are well exposed. These attain a thickness of 1200-1600 feet and overlie the Pakhals. There are red beds below the Sullavai series.

The Gondwana Group. The rocks of this group are of fluviatile or lacustrine origin which were deposited in

a series of large river or lake basins and gradually sank along trough-faults amidst the ancient rocks. There are two major divisions of this system - Upper and Lower Gondwana - based mainly on palaeontological evidence.

The Gondwanas are important for their stores of coal, fireclays and pottery clays. The following are the minerals found in the geological formations of the Gondwanas:- (1)

Upper - Pottery clay, fireclay, coal, jasper pebbles

Lower - Coal, fireclay, sandstone, pottery clay, iron ore.

The immense thickness of the Upper Paleozoic - cum - Mesozoic fluvatile - lacustrine deposits of the Gondwana system are exposed in the Satpuras and the Godawari Valley in M.P. The upper and lower subdivision of the system, brought about by the dominant fossil flora have all been represented in the said areas. The Lower Gondwanas are comprised chiefly of sandstones and shales with coal deposits in the Barakar stage. The Upper Gondwanas are represented by an abundance of sandstone with shale clay together with coal which predominates in the last stage. Both in the Lower and Upper Gondwanas certain beds are related to the relief: the Kamthi beds underlie the Wardha - Godawari Valley, the Kota over the Pranhita -

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(1) Krishnan, Rec. G.S.I., Vol. 74, Pt. 3, op.cit., p.389.

Godawari; the Denwa and Bagra beds stand up in the Tamia scarp.

The main areas of Gondwana rocks in M.P. are in the Satpura range, in the basin of the Godawari in Nagpur, Wardha, and Chanda districts, and in the Bilaspur and some of the merged Indian States.

Lameta and Infra-Trappean Beds. The Lameta beds are fluviatile or estuarine in origin. They occur below the Deccan Traps. In M.P. they are developed around Nagpur and Jabalpur, and along the Godawari Valley up to Bhopal and Indore and in the western part of the Narmada Valley. Limestones, with subordinate sandstones and clays are the chief rock types found in these beds. The thickness of the beds is from 20 to 100 ft. The Lameta series everywhere rests with a great unconformity over the older rocks.

The Infra-trappean beds are allied to the Lametas and occur below the traps. In M.P. they are found only on the right bank of the Godawari river. They are composed of yellowish, whitish and greenish sandstones. The thickness of the beds is about 50 ft. There is a slight unconformity between the Infra-trappeans and basal basalt flow.

The mineral deposits found in the above two geological

formations are limestone and manganese-ore. (1)

Deccan Trap with Inter-trappeans. At the close of the cretaceous and subsequent to the deposition of the Baghi and the Lameta beds, a large part of Peninsula India was affected by a stupendous outburst of volcanic energy, which resulted in the eruption of a thick series of lava known as Deccan Trap.

The Deccan Trap, composed of basaltic or volcanic rocks, occupies a large area in M.P. It makes up the greater portion of the districts of Sagar, Jabalpur, Mandla, Seoni, Chhindwara, Nimar, Nagpur, Wardha and nearly the whole of Berar and wide stretches of Satpuras. It is believed that the denudation of basalt rock is responsible for the black cotton soil found throughout this tract.

The Decan Trap occurs as dykes and sills in various parts of the State, especially in Korea State where there is also an enormous doleritic sill. In the adjoining parts of the Satpuras and the Narsinghpur area are found similar features. There is a great variation in the thickness of the Trap, ranging from 7,000 ft. thick near the Bombay coast to about 500 ft. at Amarkantak in Surguja and only 55 ft. in the Sausar tahsil (subdivision) of the

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(1) Krishnan, Rec.G.S.I. Vol.79, part 3., op.cit., p.389



Chhindwara district. (1) The successive eruptions of lava took place at considerable intervals of times. During the intervals some rivers and fresh water lakes came into existence. The fluviatile and lacustine deposits found in these rivers and fresh water lakes are known as Inter-trappean beds. Generally they are only 2 to 10 ft. thick, and occasionally only 6 inches thick. The Inter-trappean beds are composed of cherts, impure limestone and pyroclastic materials.

The mineral deposits found in the Deccan Trap are building stone (basalt), agate, carnelian, jasper, opal, rock-crystal, soda (trona), mineral waters, Iceland spa and zeolite.(2)

Laterite. Laterite is a product of subaerial alteration of tropical countries. It occurs principally as a cap on the summit of the basaltic hills and plateaus of highlands of the Deccan, Central India and Madhya Pradesh. Laterite caps the Traps in many places of the State, e.g., Seoni, Balaghat, Mandla and other parts of Surguja and Udaipur. It occurs at altitudes of 2,000 to 3,500 ft. a.s.l. in M.P.

Laterite as a source of iron is of very old standing.

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(1) Krishnan, Geology of India and Burma, op.cit., p.420.

(2) Krishnan, Rec. G.S.I., Vol. 74, Pt.3, 1939, op.cit., p.389.

Sir T. H. Holland showed its value as a source of aluminium and Sir L. L. Fermor of manganese. For building houses, culverts, bridges and other structure, ferruginous laterite is used in some parts of India. It does not form good soil, as it is deficient in salt and humus.

The minerals found in the geological formations of the Laterite are -

Lateritic Formations -

Laterite - Bauxite, building stone, pyrolusite, iron ore and diamonds

Lateritoid - Iron ore, manganese ore, and ochre.

Alluvium. This has developed during Pleistocene and Recent periods. The majority of the rivers of the State are bordered by strips of alluvium, e.g., the Tapi, Narmada and Godawari. Two distinct divisions of Alluvium can be distinguished. One is older (probably Pleistocene) alluvium, which is often rich in Kankar. It now suffers denudation in consequence of the earth movement. Another is a newer alluvium which is in process of formation at the present day.

The widespread older alluvium of the Narmada and Purna river appears to occupy basins formed by gentle post Deccan Trap warping of the Peninsula.

The minerals found in the geological formation of

Alluvium are brick-clays, Kankar, salt and alluvial gold.(1)

Summary. Broadly there are four important geological formations in M.P. - alluvium, the Deccan Trap, the Gondwana system and the Vindhyan series. The Narmada Valleys, from Jabalpur to Harda, is an alluvial flat and has stiff reddish yellow clay in which are mixed bands of sand and gravel. The Deccan trap contains basaltic or volcanic rocks which cover the greater part of Sagar, Jabalpur, Mandla, Seoni, Chhindwara, Nimar, Nagpur and Wardha districts. Sandstone and shale are the chief rocks of the Gondwana system and cover the districts of Chanda, Durg, Raigarh and Surguja. These rocks are also found to a certain extent in the Nagpur and Wardha districts. Sandstones, shales and limestones are the main rocks of the Vindhyan series. The Vindhyan series can be divided into two - the Upper Vindhyan and the Lower Vindhyan. Sagar and Damoh are in the Upper Vindhyan and the chief rocks are hard red masses of sandstones alternating with shales. Raipur, Bilaspur and Bastar come under the Lower Vindhyan and chief rocks are quartzitic sandstones, blue and purple limestone and shale.

"The best example of a plateau of accumulation in India" says Wadia, "is the volcanic plateau of the Deccan,

built up of horizontal lava-sheets, now dissected into uplands, hills, valleys and plains." (1) The Vindhyan mountain, with their easterly extension of the Kaimur range, are "a steep line of prominent escarpment ... " (2) In other words, they "are really scarps of the plateau region." (3) Wadia thinks that probably "parts of the Satpuras are, like the Aravallis, a weather-worn remnant of an old tectonic chain." (4)

The drainage has been affected so much "that the Narbada and Tapti do not flow in valleys of their own eroding, but have usurped for their channels two fault-planes, or deep alluvium-filled rifts in the rocks, running parallel with the Vindhys." (5) The presence of cascades and waterfalls in the upper courses of many rivers of the State shows that there had been some uplift of the western Ghat. The Vindhya and Satpura ranges form a watershed. From this the Chambal, the Sind, the Betwa, the Ken and the Son flow to the north, the Damodar and Subarnerekha to the east, the Wainganga and the Wardha to the south, and the Narmada and Tapi to the west.

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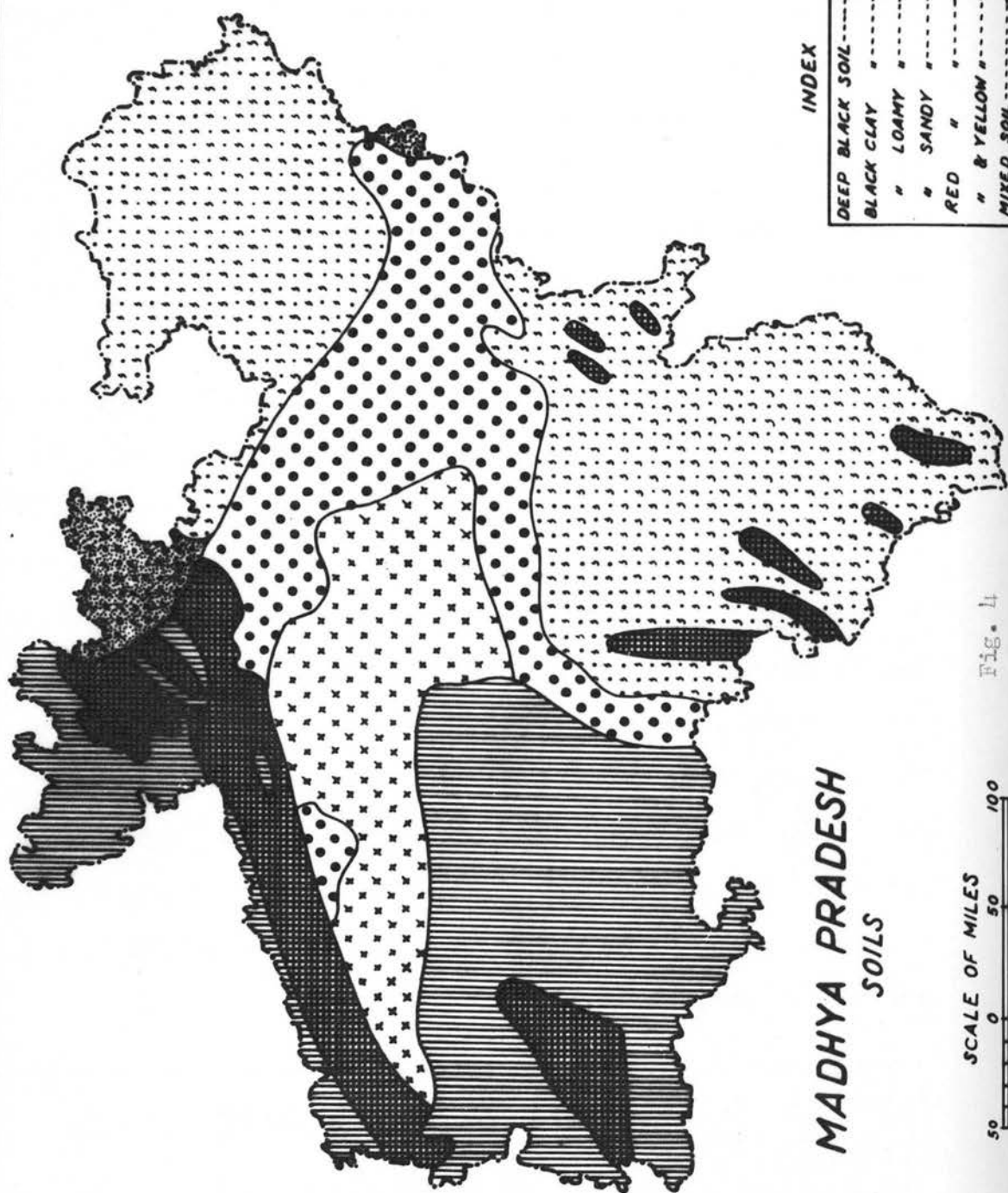
(1) Wadia, Geology of India, op.cit., p.318.

(2) Ibid, p.11.

(3) Wadia, loc.cit., p.11.

(4) Ibid, p.11.

(5) Ibid, p.17.



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DEEP BLACK SOIL	-----
BLACK CLAY	-----
" LOAMY	-----
" SANDY	-----
RED	-----
" & YELLOW	-----
MIXED SOIL	-----

# MADHYA PRADESH SOILS

SCALE OF MILES  
50 0 50 100

Fig. 4

## Section B. Soil

For most of the countries of the World, soil is their most valuable national asset. For an agricultural country as India is, where the whole economy was based, till recently, on agricultural produce, its importance cannot be over-emphasised. Though Soil supports the natural vegetation and supplies the food and other crops, its scientific study has been neglected not only in India, but even in such scientifically advanced countries as United Kingdom and the United States.

As far as India is concerned Spate says that "the most competent pedologist would probably find it impossible to present a general view of the soil-pattern of India which should be at once accurate, comprehensive, and reasonably detailed" (1) The Commonwealth conference on Tropical and Subtropical Soils realized the necessity of accurate soil maps for the planned utilization of tropical lands. (2) The Royal Commission on Agriculture in

- 
- (1) Spate, O.H.K. - India and Pakistan, London 1954, p. 80.
  - (2) Commonwealth Bureau of Soil Science. Technical Communication No. 46. Proceedings of the First Commonwealth Conference on Tropical and Subtropical Soils, 1948, Herpenden, England 1949, p.110

(2) Ibid., p. 74.

(3) Spate, op. cit., p. 81.

(4) Russell, E.G. - Report on the work of the I.C.A.S. in Applying Science to crop production in India, Delhi 1937, p. 224.



India accepted that "a soil survey would be desirable with a view to classifying and mapping these soils by modern methods."(1) But further it says that

"a soil survey of the whole of India on the lines of the soil survey now in progress in the United States of America would, however, be a gigantic enterprise, and we do not recommend that it should be undertaken at the present time."(2)

This recommendation of the Royal Commission needs no comment and its adverse effect is obvious from the fact that "only 17,000 sq. miles (1.07% of all-India) had been subjected to modern sample surveys by 1947,..."(3) In the meetings of the Board of Agriculture in India, held in 1935 and 1937, one of the recommendations was for the survey of the soils of India. The recommendation was postponed to be considered in the light of the report of Sir John Russell. Russell submitted the Report in 1937 in which he recommended the setting up of a Soil Conservation Committee and one of its functions would be "to arrange for the collection of results of soil analyses, and the accumulation of material for a soil map of India."(4) In May 1939, the Advisory Board of Imperial (now Indian) Council of Agricultural Research approved a

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- (1) Report of the Royal Commission on Agriculture in India, Bombay 1928, p. 74.
  - (2) Ibid., p. 74.
  - (3) Spate, op. cit., p. 81.
  - (4) Russell, E.G. - Report on the work of the I.C.A.R. in applying Science to crop production in India, Delhi 1937, p. 224.

scheme of All-India soil survey, whose Report was published in 1953. The Soil Survey Officer writes in the Introduction of the Report that

"Most of the analytical data refer to surface soil samples and in many districts the number of samples analysed is too meagre. Moreover, it is not definitely known whether the samples are representative of the typical soils of the district as they are generally collected at the Government Farms. Further, the analyses are not always complete on relevant points. All these facts restrict the value of the conclusions drawn from the above data."(1)

Anyhow steps in the right direction have already been taken and in due course the defects should be remedied.

There is residual soil in the greater part of the Indian Peninsula. This has resulted from alternating humidity and desiccation as experienced in most tropical countries. There is a great variety of soil in the Peninsula. It varies in texture and minerological composition depending upon the nature of the rock underlying it.(2)

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- (1) Final Report of the All India Soil Survey Scheme, The Indian Council of Agricultural Research, Delhi 1953, p. 5.
  - (2) Wadia, D.N. - Geology of India, 3rd Edn., London 1953, p. 507.

In 1908, the C.P. Gazetteer gave the following types of soils in C.P. (excluding Berar):-

1. Heavy black soil.
2. Shallow black soil.
3. Light sandy and stony uplands soils.
4. Yellow and sandy soil. (1)

For Berar, the following are given, in the Berar Gazetteer:-

1. Light brown alluvium.
2. Alluvium of loam.
3. Black.
4. Inferior light. (2)

In 1930, the Report of the Provincial Banking Enquiry Committee recognized 3 agricultural zones in Madhya Pradesh and made 3 types of soils. The types are:-

1. Rich black clay and clay loam - "black cotton soil".
2. Clay loam.
3. Rich clay and clay loam soil. (3)

Another classification has been made in the Census Report of 1951. This was compiled by the Director of Land Records. According to that Report there are 18 types of soils found in the N.W. Division of the State, 9 in the East Division and about half-a dozen in the South West Division. (4)

- (1) Imperial Gazetteer, Provincial Series, C.P., Calcutta 1908, p. 36.
- (2) Imperial Gazetteer, Provincial Series, Berar, Calcutta 1909, p. 25.
- (3) Report of the C.P. Provincial Banking Enquiry Committee, Vol. I 1929-30, Nagpur 1930, pp 27, 29 and 31.
- (4) Census of India 1951, Vol. 7, MP., Part 1-A, pp 292, 294, 295, 297.

The Report of the Forest Policy Committee, has distinguished 7 types of soils found in Madhya Pradesh, as given below

1. Deep black soils.
2. Black clay soils.
3. Black loamy soils.
4. Black sandy soils.
5. Red sandy soils.
6. Red and yellow soils, and
7. Mixed soils. (1)

The above classification is based on the Soil Map of India, prepared by the Imperial (now Indian) Agricultural Research Institute.

The most recent is the Final Report of the All India Soil Survey Scheme which was published in 1953. This classification, with its own limitations and shortcomings, is based on scientific study and is comparatively reliable. It distinguishes 5 types of soil in Madhya Pradesh, as given below.

1. Deep heavy black soil.
2. Black clay soil.
3. Shallow clay loam.
4. Gravelly soils.
5. Light, sandy, red and yellow (2)

In view of the fact that the soil survey embodied in the Final Report of the All India Soil Survey Scheme, is based

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- (1) Report of the Forest Policy Committee, M.P., Nagpur 1952, pp 12 and 13.
  - (2) Final Report of the All India Soil Survey Scheme, Delhi 1953, pp 26 and 27.

on various factors including the scientific study of soils, it is proposed that this classification should be adopted.(1) It may be pointed out here that "in view of the nature and amount of the available data it may be said that the maps show only the general distribution of major soil groups..."(2)

1. Deep Heavy black soil. This covers the district of Hoshagabad and part of the district of Amravati. It is derived from alluvial deposits. It is deficient in phosphoric acid, nitrogen and humus, but generally not in potash and lime.(3) In M.P. this soil is pre-eminently suited for the cultivation of wheat.(4)

2. Black clay soil. It is the most widely distributed soil in the State. It is derived from the trappean rocks. It covers the districts of Sagar, Nimar, Amravati (part only), Akola, Yeotmal, Buldana, Wardha, Nagpur and Jabalpur. This is typical 'regur' or 'black cotton soil'. It is highly argilla-ceous, and cal-careous to a certain extent. Its grains are very small. The moisture retention power is very

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- (1) Final Report of the All India Soil Survey Scheme, Delhi 1953, p. 218.
  - (2) Ibid., p. 47.
  - (3) Ibid., p. 16.
  - (4) Report of the Forest Policy Committee, op. cit., p.12.

high. There is a high percentage of iron oxide and calcium and magnesium carbonates. It also has an admixture of varying amounts of humus. The colour of the soil is due probably to the presence of iron and humus.(1) The depth of the soil varies from one to two feet to several feet. In certain places the depth may be more than 20 feet.(2) In Madhya Pradesh, this soil is suited for the cultivation of cotton and juar.(3)

3. Shallow clay loam soil. It is found in the major parts of Betul, Chhindwara and Bhandara districts. It is an admixture of the Deccan Trap and the older Archaean rocks. It is somewhat coarse. It is not so suitable for agricultural purposes as the two discussed above. Most of the soil is covered with forests, or under inferior millet.(4)

4. Gravelly Soil. As its name indicates it is stony intermixed with sand and is found in the districts of Mandla, Chanda and Bastar. It is not good for cultivation and only the minor autumn crops are grown on it.

- 
- Geology of India
- (1) Wardia, /op. cit., p. 511.
  - (2) Final Report, op. cit. p. 14.
  - (3) Report of the Forest Policy Committee, op. cit., p. 12.
  - (4) Ibid., p. 13.



5. Light, sandy, red and yellow soil. This covers the major parts of the districts of Bilaspur, Raipur, Durg, Balaghat, Surguja and Raigarh. The red soil is lighter in texture and porous, and has soluble salts in small quantity. The red soil has been "derived from the rock in situ or from its products of decomposition washed to a lower level by rain."(1) There is a great variation in depth and fertility. Under irrigation red soil produces a large variety of crops. It is deficient in nitrogen, phosphoric acid, humus and lime, but is rich in kaolinitic type of mineral.(2) As far as yellow soil is concerned "very little is known about these yellow soils"(3). The red sandy soil is covered either with extensive forests mostly of Sal or with rice cultivation.(4)

Soil Erosion. There are various types of soil erosion experienced in different parts of India. But "it is difficult to estimate quantitatively the loss caused to Indian agriculture from the effects of various types of soil erosion."(5)

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- (1) Final Report of the All India Soil, op. cit., p.13.
  - (2) Ibid., p. 14.
  - (3) Ibid., p. 14.
  - (4) Report of the Forest Policy Committee, op. cit., p. 13.
  - (5) The **First** Five Year Plan, Govt. of India Planning Commission, Delhi 1953, p. 131.

This fact can be ascertained from "an examination of crop yields over a period of 40 years (which) indicates that Indian soils have reached an almost static condition at a very low level of fertility ..." (1). The first step is to ascertain the extent and nature of the misuse to which the soils are subject and the extent and degree of damage already wrought on them.

The causes of erosion in Madhya Pradesh are generally ruthless deforestation, shifting cultivation, over-grazing and faulty methods of cultivation. According to the National Planning Committee Report on soil conservation and Afforestation "overgrazing is emphasised as the main cause of erosion." (2) When vegetation cover is removed, sheet erosion also takes place.

Soil Conservation. For a State like Madhya Pradesh, whose economy is based on agriculture and forestry, soil conservation is an important problem which must be tackled on sound foundation. Soil Conservation in its broad sense not only covers soil erosion but also manuring of soils, provision of irrigation and other measures to improve the fertility of the soil.

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(1) The First Five Year Plan, Govt. of India Planning Commission, Delhi 1953, p. 131.

(2) Soil Conservation & Afforestation, National Planning Committee, Bombay 1948, p. 74.

In the State some remedial measures have been taken in connection with the soil conservation. One of them is the field bund which is commonly developed and which checks serious sheet erosion. Another step taken by the State Forest Department is rotational grazing schemes. In connection with grazing two problems need careful attention. One is the substitution of stall feeding and proper pasture management for grazing.(1) The other is getting rid of millions of useless livestock. The Forest Department has also taken up some working plan for the afforestation of the upper catchment areas of the rivers.

The Govt. of India Planning Commission recommended that "the problem of soil erosion on the cultivator's fields" be tackled during the First Plan periods.(2) In the Second Five Year Plan it is reported that

"soil conservation measures such as contour cultivation, strip cropping, mulch farming, bunding, terracing, gully plugging, check damming etc. carried out in a planned manner can do much to arrest deterioration of land and, in due course, restore its productivity."(3)

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- (1) Glover, Sir Harold - Soil Erosion, Oxford Pamphlets on Indian Affairs No. 23, Bombay 1944, p. 32.
  - (2) The First Five Year Plan, op. cit., p. 132.
  - (3) The Second Five Year Plan, Govt. of India Planning Commission, Delhi 1956, p. 307.

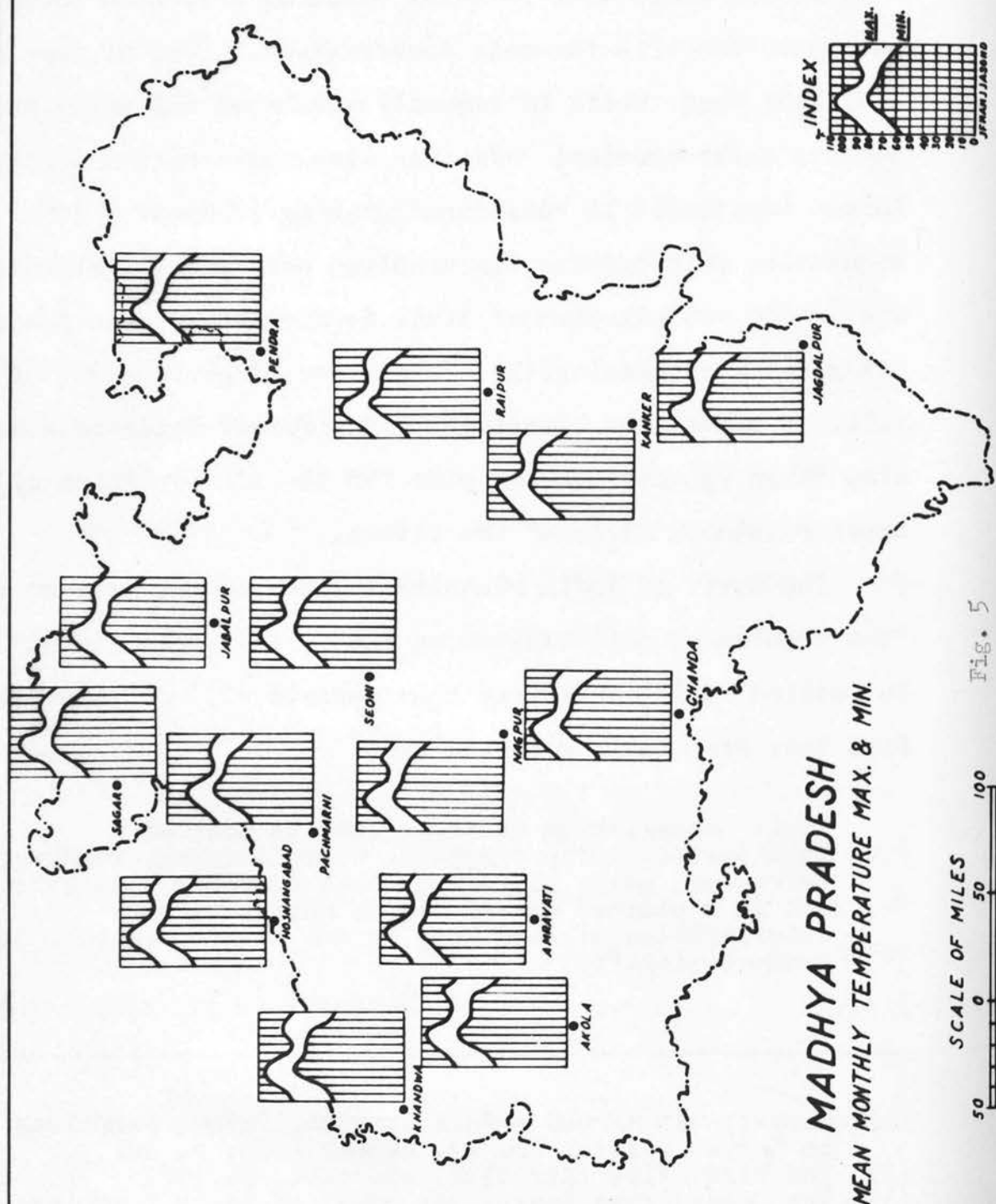


Fig. 5

In the Second Five Year Plan it is proposed that "such measures are to be undertaken over about 2 million acres of agricultural lands" in the whole of India.(1)

### Section C. Climate

(Figs. 5-11)

The State of Madhya Pradesh, situated as it is in the heart of the sub-continent of India, has a tropical monsoon type of climate. The climate of India is controlled by monsoons - a winter monsoon (N.E. Monsoon) and a summer monsoon (S.W. Monsoon). From January to Mid-June it is under the influence of N.E. Monsoon, while from Mid-June to December it is under the S.W. Monsoon. The monsoon is the common feature of the climate of India, otherwise a diversity of climate is found. When India is under the influence of N.E. Monsoon, the wind blows from land to sea and consequently it is dry. During the influence of S.W. Monsoon, the wind direction is from sea to land, resulting in high humidity and

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(1) The Second Five Year Plan, Govt. of India Planning Commission, Delhi 1956, p. 307.

general rainfall. There is a great variation in diurnal and annual range of temperature. Rainfall is mainly confined to a few months of the rainy season and the rest of the year is more or less dry. Even during the period of the rainy season, rainfall is not evenly distributed but the greater amount falls during a few days. There is always drought in one part of the country and flood causing havoc and devastation in other part. Rainfall is generally in the form of downpour, heavy and torrential, resulting in soil erosion if the land is not covered with vegetation.

The seasons, recognised by the Indian Meteorological Department, are four, viz

- (a) the season of the northeast monsoon.
  - (i) January and February, cold weather season
  - (ii) March to Mid-June, hot weather season.
- (b) the season of the southwest monsoon.
  - (i) Mid-June to Mid-September, season of general rain
  - (ii) Mid-September to December, season of retreating monsoon. (1)

There is another popular division of the seasons of India, which has also been adopted by the Government of India for its administrative purposes. According to that there are

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(1) Kendrew, W.G. - The Climates of the Continents, 3rd Edn., Oxford 1937, p. 12.



**MADHYA PRADESH**  
**JANUARY ISOTHERMS**

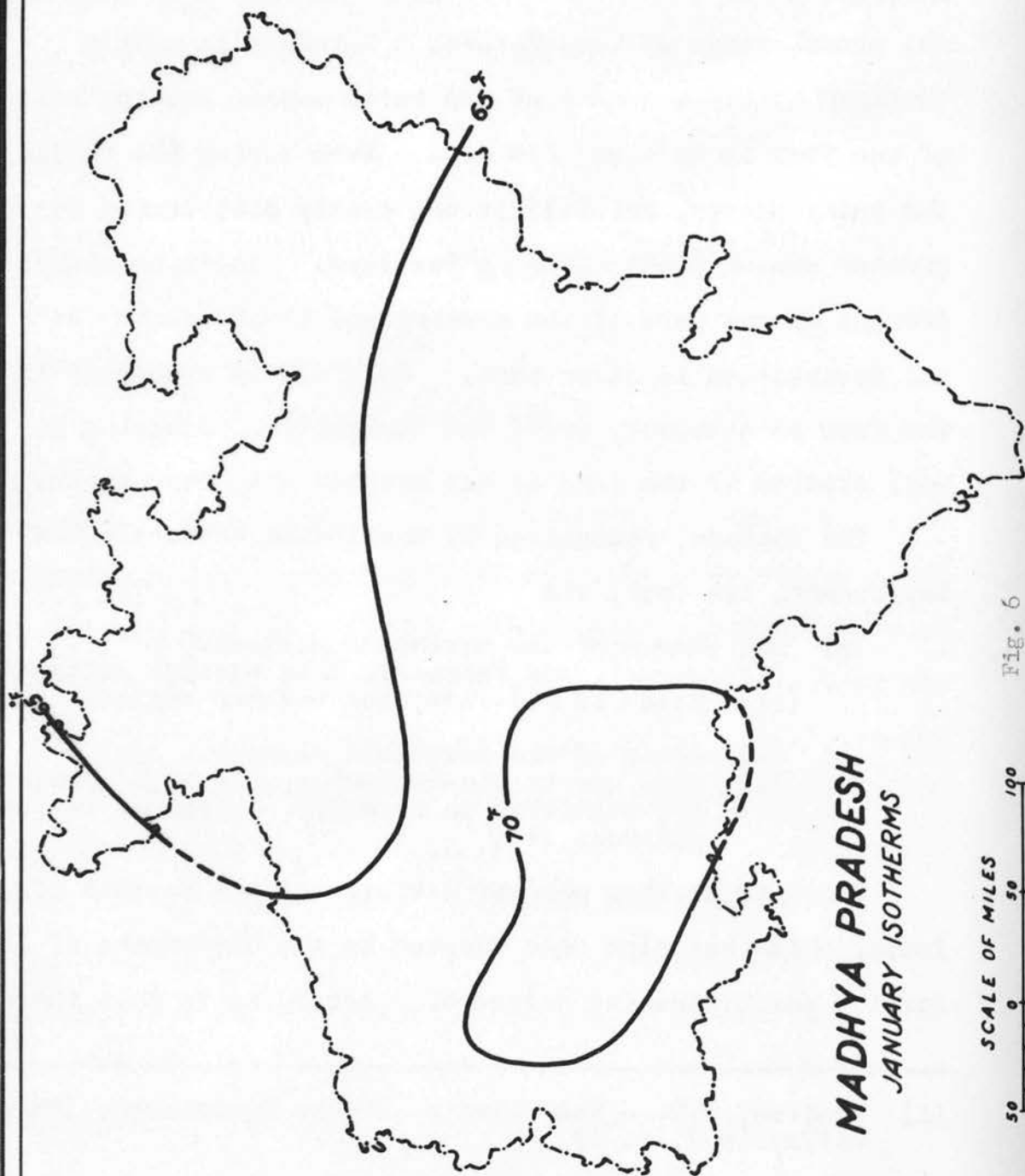


Fig. 6

three seasons, viz.

- (1) Cold weather season - Mid-October to Mid-February.
- (2) Hot weather season - Mid-February to Mid-June.
- (3) Rainy season - Mid-June to Mid-October.

In describing the climate of Madhya Pradesh, the popular division has been adopted for two reasons. Firstly, according to the Meteorological division, January is the coldest month and the cold weather season begins in January. This is correct for the Plains of Northern India. But in Madhya Pradesh the coldest month is December. The popular division more correctly fits into the climate of the State. Secondly, "though less correct theoretically, this division accords very well with the sensible weather conditions." (1)

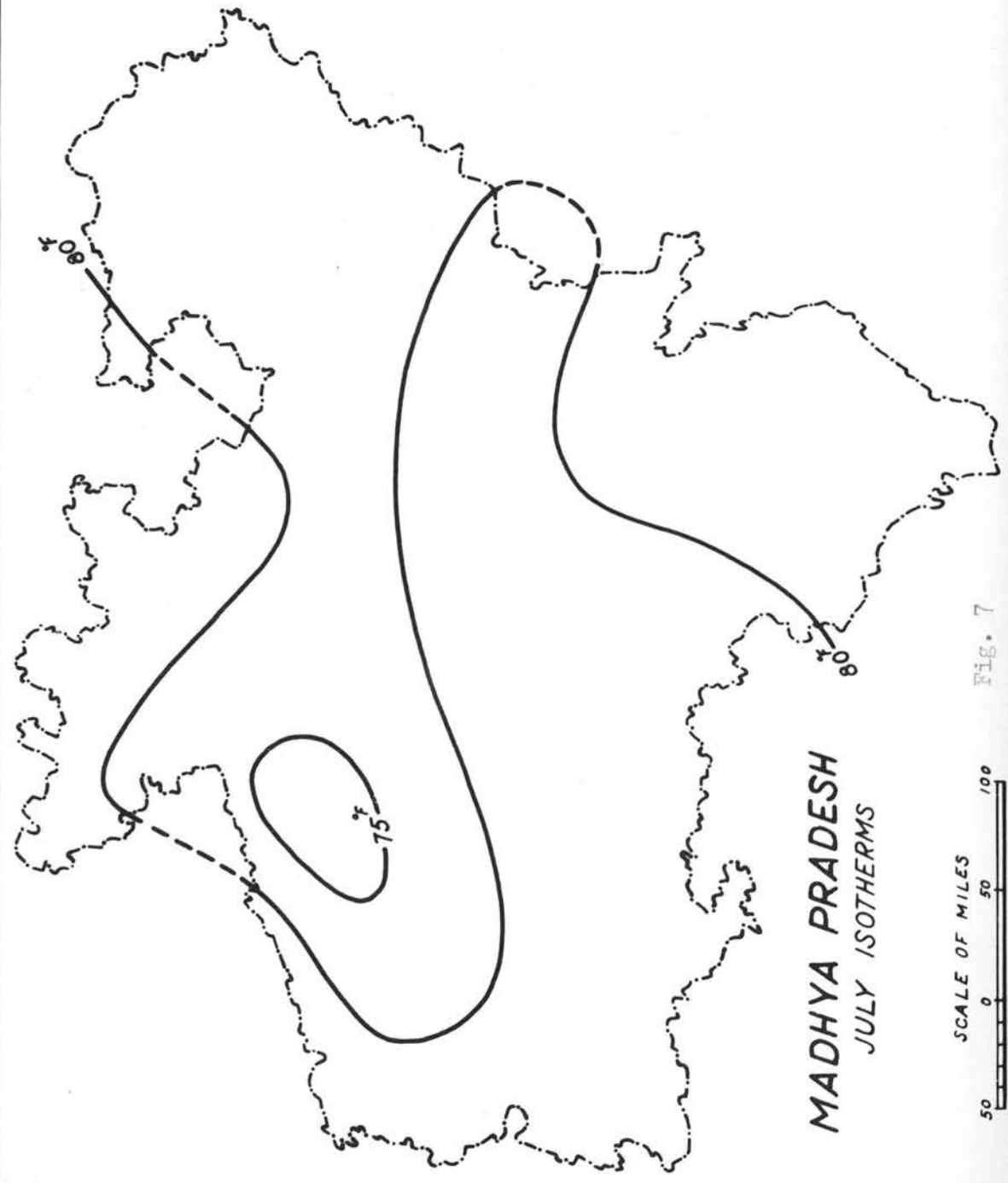
1. Cold weather season. The pressure distribution over Madhya Pradesh does not directly affect the weather condition of the place and it must be studied in context with the distribution over the whole sub-continent, of which it is a part. A high pressure belt develops over N.W. India in December and pressure decreases outward. There is a decrease of pressure from N.W. India towards the south. Particularly, there is a decrease of pressure from northwest to southwest. (2) In Madhya Pradesh the wind direction in the cold

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- (1) Spate, O.H.K. - India and Pakistan, op. cit., p. 41.
  - (2) Eliot, Sir John - Climatological Atlas of India, Edinburgh 1906, Plate 11.

season is generally east and northeast. The velocity of wind during cold weather is low, generally 1-3 miles per hour(1). Dry outblowing winds occur from land to sea.

December is the coldest month of the year. The mean maximum temperature is 85°F at Akola, 83°F at Chanda, 82°F at Nagpur and 78°F at Seoni (Chhindwara district).(2) The mean minimum temperature is 53°F at Akola, 53°F at Chanda, 57° at Nagpur, and 51° at Seoni.(3) In other words, the temperature increases from the north to the south. Excluding the hill station Pachmarhi, Jabalpur and neighbourhood, being on the northern margin of the State, is the coldest area. The only exception to the general rule of December being the coldest month, is Sagar where the coldest month is January. The mean max. and min. of Sagar are 76.7°F and 52.5°F for January and 76.9°F and 53.0°F for December. This is probably due to situation. Sagar lies at the extreme northwest of the State. It consists of a flat tract about 1,000 feet above the level of the Narmada Valley. It faces the north and the east, as its drainage is almost entirely to that direction. Hence, due to this situation and aspect its climate resembles that of the northern plains where December is the coldest month.

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- (1) Climatological Tables of Observatories in India, Delhi 1953, pp 269-294.  
 (2) Ibid., pp 269-294.  
 (3) Ibid., pp 269-294.



MADHYA PRADESH  
JULY ISOTHERMS

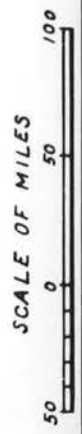


Fig. 7

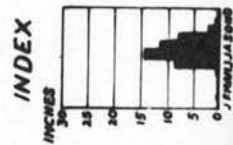
Table No. 3 showing mean maximum and minimum temperatures in December.(1)

<u>Station</u>	<u>Mean Max Temp.</u> ( <u>F</u> )	<u>Mean Min. Temp.</u> ( <u>F</u> )	<u>Lowest</u> <u>Recorded</u>
1. Khandwa (Nimar)	84.1	51.5	33
2. Hoshangabad	80.0	53.9	38
3. Sagar	76.9	53.0	34
4. Jabalpur	77.1	46.5	32
5. Seoni (Chhindwara)	77.7	50.6	37
6. Pachmarhi	71.3	45.8	30
7. Pendra (Bilaspur)	73.7	49.6	35
8. Raipur	80.0	54.5	41
9. Kankar (Bastar)	80.1	50.7	39
10. Chanda	82.5	52.8	37
11. Jagdalpur (Bastar)	78.8	49.7	40
12. Amravati	83.2	58.4	41
13. Akola	84.7	53.3	36
14. Nagpur	81.7	57.2	39

Generally the sky during this period is clear and cloudless. There are two exceptions to this general rule. In October and November there is some rainfall due to the retreat of the monsoon, giving greater rainfall in Eastern Madhya Pradesh, than the western part. The other is some showery weather which is usually associated with the winter disturbances travelling across north India at this time of the year. The average monthly rainfall is less than one inch for the winter months. During the period of winter disturbances, there is slightly more rainfall in the northern

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(1) Climatological Tables of Observatories in India, Delhi 1953, pp 269-294 and 415.



# **MADHYA PRADESH** **MEAN MONTHLY RAINFALL**

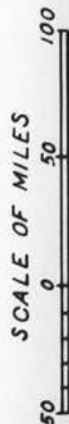
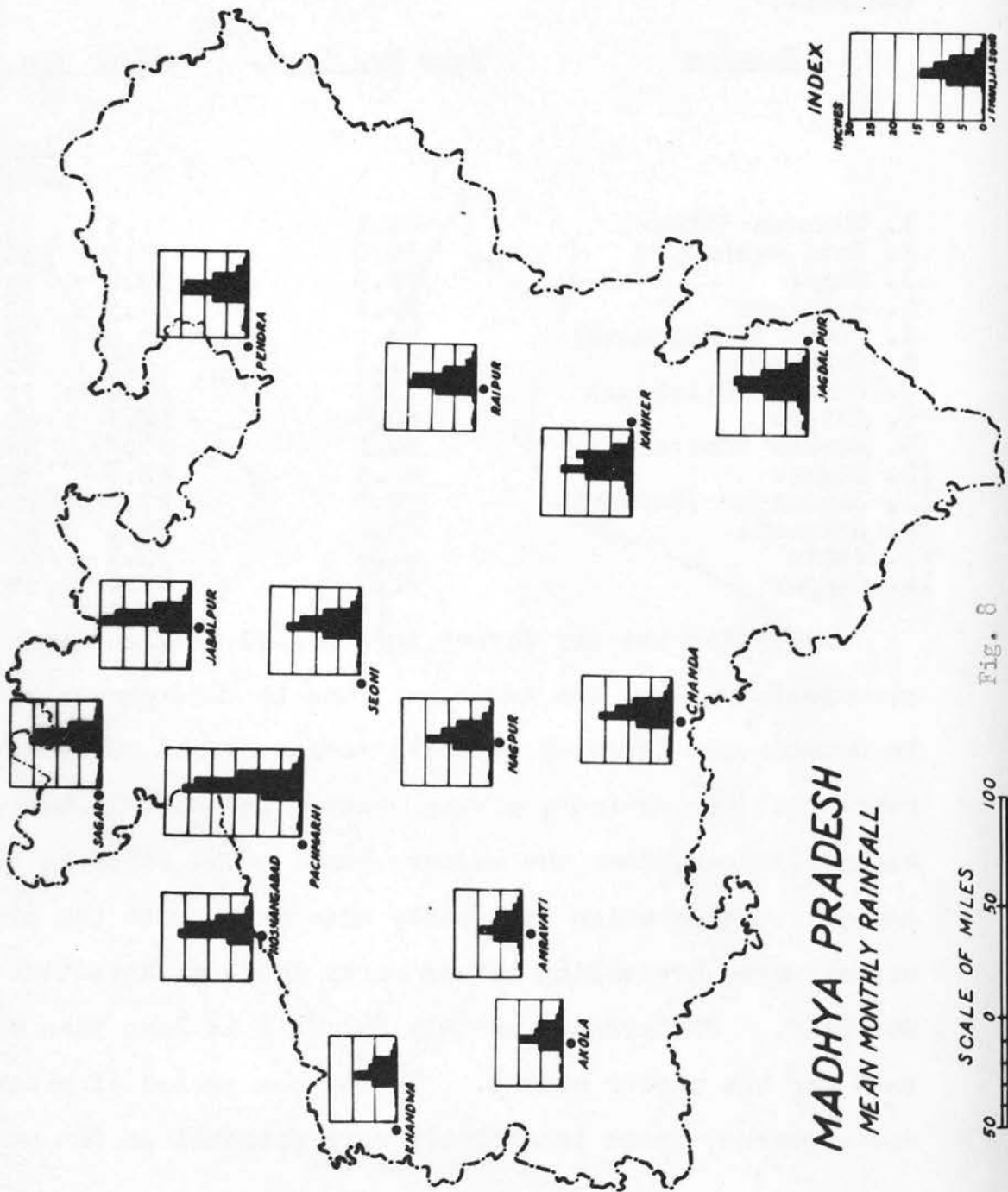


Fig. 8



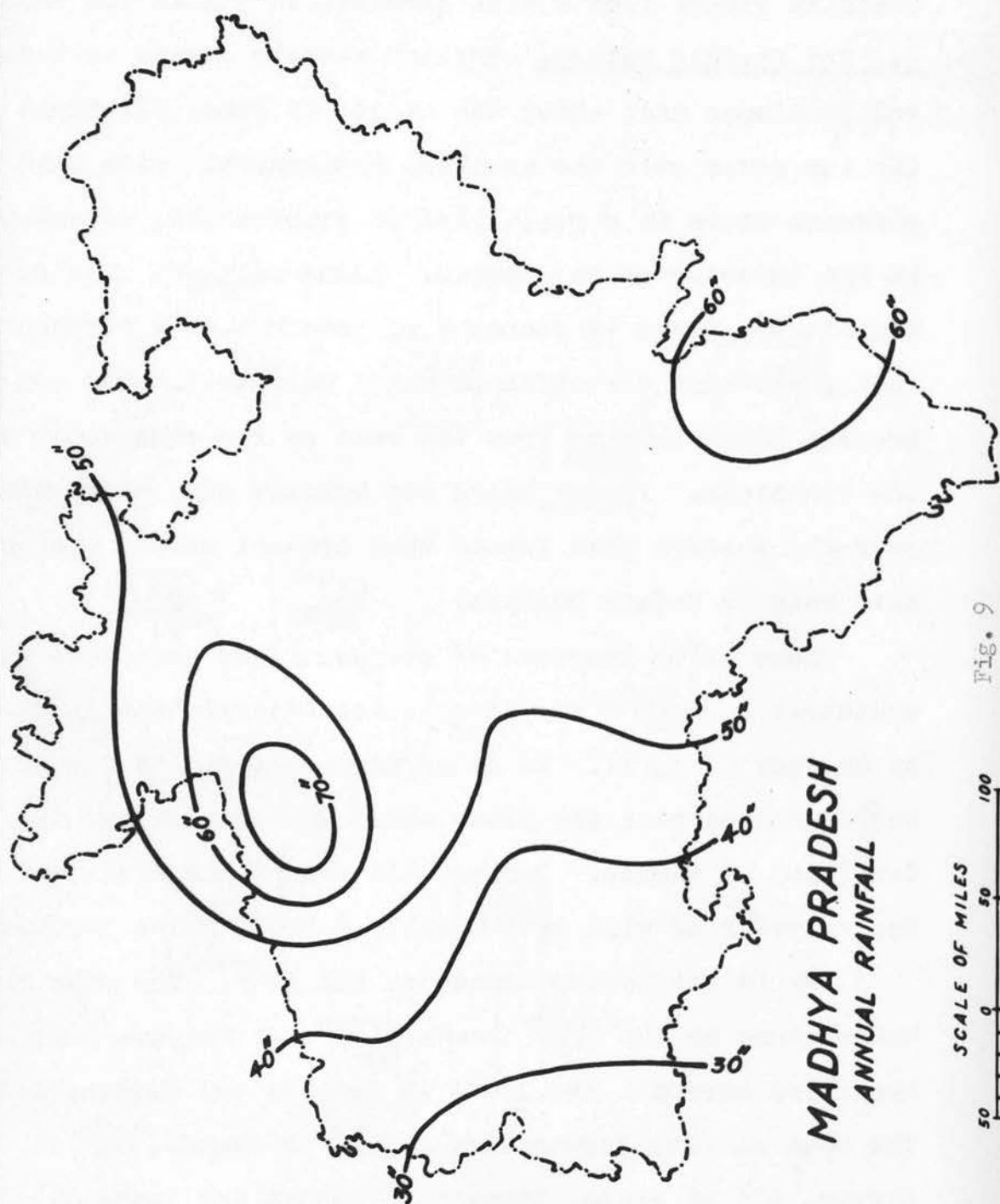


part of the State than the southern. The relative humidity ranges from 49% at Amravati to 68% in ~~the~~ Chanda.

2. Hot Weather Season. The hot weather begins in March and continues till about the middle of June. By March the sun moves over the northern hemisphere. With this movement there is a rapid rise of temperature, especially in the interior of the Deccan. Along with the rise of temperature there is decrease of pressure. In northern India, the wind direction is still northwest. But sea breezes start blowing from the west on the west coast of the Peninsula. Though these sea breezes give some rainfall over the western Ghat coasts they are not strong enough to give rain to Madhya Pradesh.

There is an increase of pressure from northwest to southwest - reverse of the pressure distribution in winter - by the end of April. In other words a definite low-pressure belt develops over the place where a high pressure was developed in winter. During this season the wind is variable. The velocity of wind is generally 5 to 10 miles per hour.

May is the hottest month of the year. The mean maximum temperature is  $109^{\circ}\text{F}$  at Chanda,  $109^{\circ}\text{F}$  at Nagpur,  $108^{\circ}\text{F}$  at Akola and Amravati and  $107^{\circ}\text{F}$  at Khandwa and Hoshangabad. The mean minimum temperature is  $82^{\circ}$  at Chanda,  $83^{\circ}$  at Nagpur,  $81^{\circ}$  at Akola, Amravati, Khandwa and Hoshangabad.



SCALE OF MILES



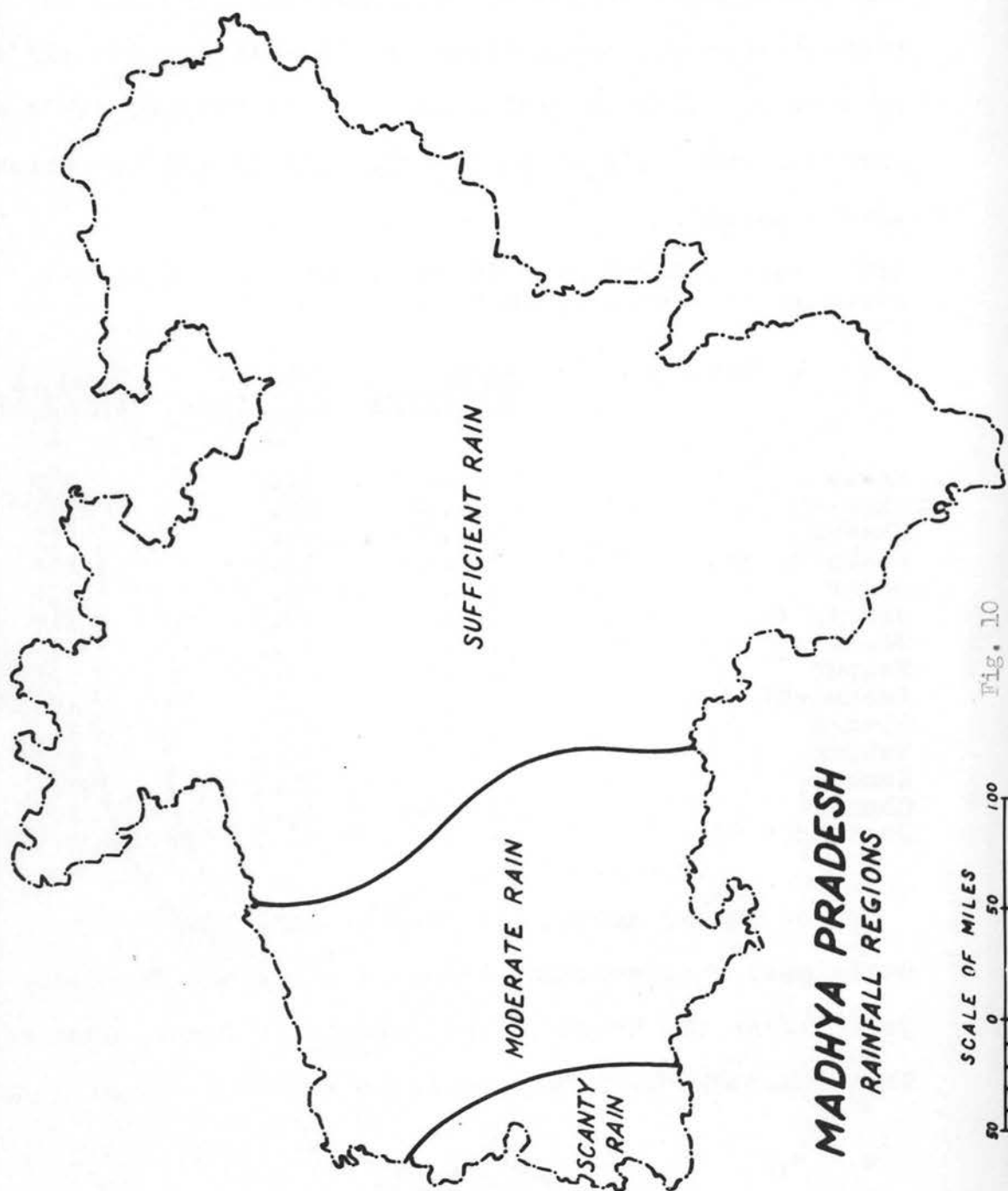
Fig. 9

The temperature shoots up on individual days and the highest recorded temperature is  $119^{\circ}\text{F}$  at Chanda,  $118^{\circ}\text{F}$  at Nagpur,  $117^{\circ}\text{F}$  at Akola, Khandwa and Raipur,  $116^{\circ}\text{F}$  at Amravati and  $115^{\circ}\text{F}$  at Jagdalpur. The plains are comparatively hotter.

Table No.4 showing mean maximum, minimum and highest recorded temperatures in May.

<u>Station</u>	<u>Mean</u> <u>Max Temp.</u> <u>(F)</u>	<u>Mean</u> <u>Min Temp.</u> <u>(F)</u>	<u>Highest</u> <u>Recorded</u> <u>(F)</u>
Akola	108.2	81.3	117
Amravati	107.6	80.7	116
Khandwa	106.9	81.1	117
Hoshangabad	106.9	81.0	114
Sagar	104.6	79.3	114
Jabalpur	105.4	77.3	114
Seoni	103.6	76.3	112
Nagpur	108.7	82.7	118
Pachmarhi	95.8	75.1	105
Pendra	100.3	77.3	111
Raipur	107.3	82.1	117
Kankar	104.4	79.3	112
Chanda	109.4	82.1	119
Jagdalpur	101.4	74.7	115

The summer months are usually dry. There are occasional thunderstorms reaching a maximum frequency just before the break of the monsoon in June. Some of these thunderstorms may result in rain but all of them



**MADHYA PRADESH**  
**RAINFALL REGIONS**

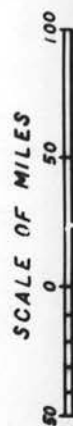
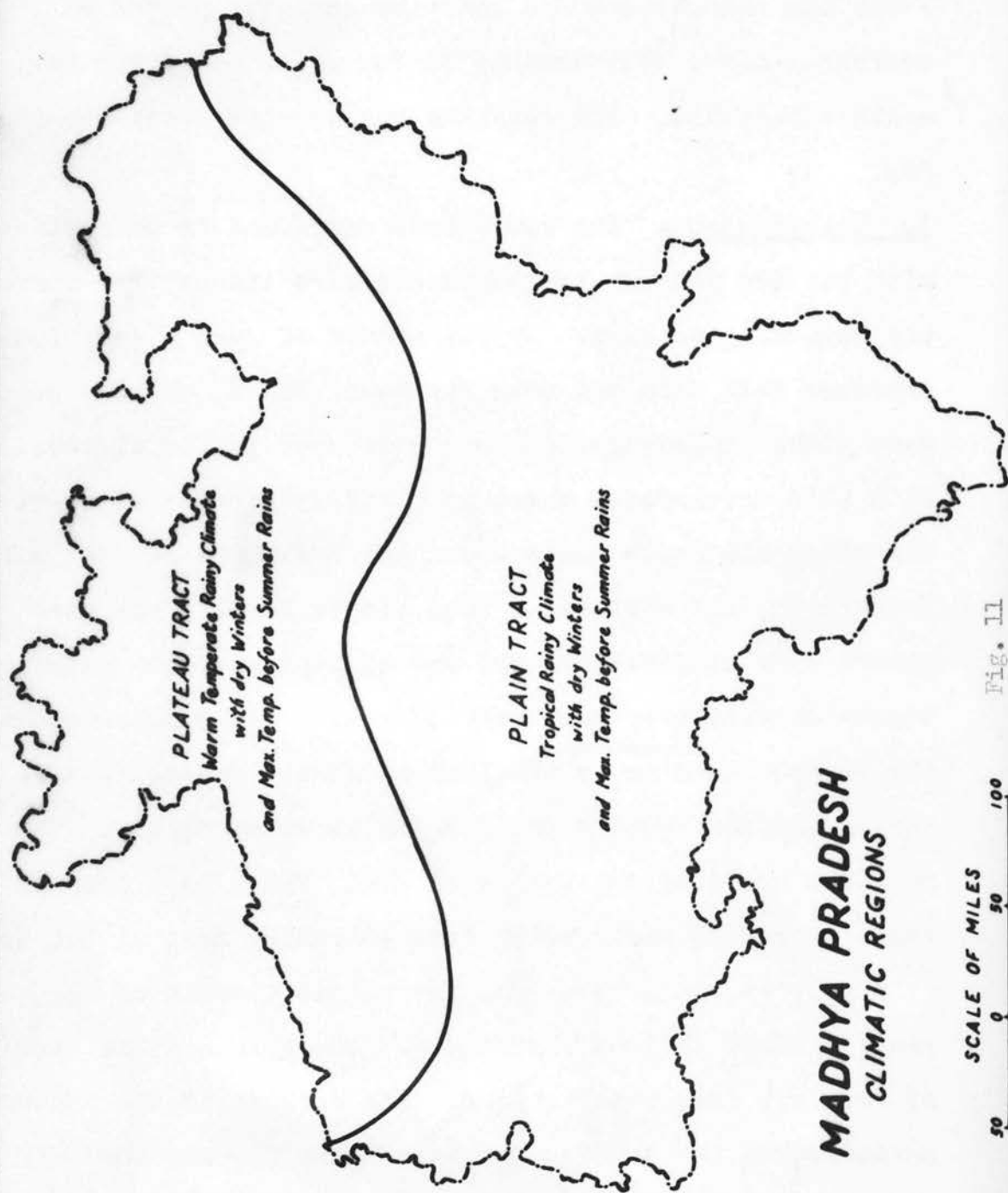


Fig. 10

lower the temperature for sometime and give relief to scorching heat. The humidity is low which makes the hot weather bearable. The relative humidity is about 35% in May.

3. Rainy Season. The conditions described in connection with the hot weather season become more intensified during the beginning of June. By the middle of June a definite low pressure belt develops over northwest India, exactly at the same place where high pressure developed in the winter. With this development there is a complete reversal of wind direction and India comes under the influence of S.W. monsoon. Henceforth, the wind blows from sea to land. From the second week of June till the end of September the rainy season obtains over most part of India. In Madhya Pradesh the monsoon sets in by the 10th of June. During this period the air remains saturated with water vapour. The relative humidity remains above 80%. There is a drop in temperature and much relief from scorching heat of the sun.

July is, on an average, the rainiest month of the year, closely followed by August. There is a great variability of rainfall from year to year. The current of the southwest monsoon from the Arabian Sea is responsible for the bulk of the rainfall in the state. The eastern half of the state



**PLATEAU TRACT**  
*Warm Temperate Rainy Climate  
with dry Winters  
and Max. Temp. before Summer Rains*

**PLAIN TRACT**  
*Tropical Rainy Climate  
with dry Winters  
and Max. Temp. before Summer Rains*

**MADHYA PRADESH**  
**CLIMATIC REGIONS**

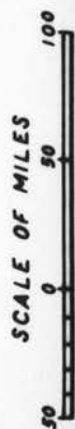


Fig. 11



also gets the rainfall from the Bay of Bengal storms. At times in association with the storms of the Bay of Bengal, very heavy rainfall ~~sometimes~~ occurs over N.W. and E. Madhya Pradesh.

Table No.5 showing average annual rainfall in certain stations of Madhya Pradesh.

<u>Station</u>	<u>Average Annual Rainfall</u> ( <u>in inches</u> )
Khandwa	31
Hoshangabad	50
Gandai (Durg district)	43
Pendra (Belaspur)	54
Jagdulpur (Bastar)	63
Dhute (Balaghat)	69
Nagpur	49
Akola	32

The intensity of rainfall decreases as one goes from east to west (Fig.10). The eastern half of the state receives some rainfall also in October and November at the time of the retreat of the monsoon.

In October there is a slight rise of temperature for a few days and afterwards a fall. Cold weather starts by about beginning of November.

Climatic Regions. Madhya Pradesh has two distinct climatic regions (Fig.11). One of them is the plateau tract 2,000 to 4,000 feet above mean sea level, and the other is the plain tract below 2,000 feet down to nearly 500 feet. The

districts lying on the Vindhyan and Satpura uplands are Sagar (including Damoh), northern part of Jabalpur, Mandla, Balaghat, Chhindwara, Betul, eastern part of Nimar and the hill station of Pachmarhi (Hoshangabad District). These districts together form a distinct climatic region. The rest of the State forms the other climatic region. The plateau region generally enjoys a distinctly cooler climate, the highest temperature seldom rising above  $105^{\circ}\text{F}$  and the lowest a few degrees above the freezing point except in certain low-lying depressions where several degrees of frost are sometimes recorded. The plains are comparatively hotter, the maximum temperature shooting up to  $115^{\circ}\text{F}$  and even  $120^{\circ}\text{F}$  in the afternoons, for several days towards the end of May, especially when no mango showers are received. The lowest temperature seldom falls below  $45^{\circ}\text{F}$  and the cold weather is of very short duration.

Table No.6 showing mean maximum and minimum temperatures for January for the 2 regions of Madhya Pradesh.

(see below)

Table No. 6 Showing mean max. and min. temperatures for January for the 2 regions of M.P.

Districts of the Plateau	Jan(°F)		Districts of the Plain	Jan(°F)	
	Mean	Min.		Mean	Min.
Sagar	76.9	53.0	Nagpur	81.7	57.2
Jabalpur	77.1	46.5	Chanda	82.5	52.8
Seoni (Chhindwara)	77.7	50.6	Khandwa (Nimar)	84.1	51.5
Pachmarhi	71.3	45.8	Akola	84.7	53.3

Table No. 7 Showing mean max. and min. temperatures for May for the 2 regions

Districts of the Plateau	May(°F)		Districts of the Plain	May(°F)	
	Mean	Min.		Mean	Min.
Sagar	104.6	79.3	Nagpur	108.7	82.7
Jabalpur	105.4	77.3	Chanda	109.4	82.1
Seoni (Chhindwara)	103.6	76.3	Khandwa (Nimar)	106.9	81.1
Pachmarhi	95.8	75.1	Akola	108.2	81.3

The highest recorded temperature over the Plateau Region is  $114^{\circ}\text{F}$  at Sagar and Jabalpur while on the Plain Region it is  $119^{\circ}\text{F}$  at Chanda. The lowest recorded temperature is  $30^{\circ}\text{F}$  at Pachmarhi in the Plateau Region and  $33^{\circ}\text{F}$  at Khandwa in the Plain Region.

Though the average annual rainfall of the State varies from about 30" in the west to about 60" in the east, the rainfall is greater over the Plateau Region than over the adjacent areas of the Plain Region. The average annual rainfall of Hoshangabad is 50.6 inches, while Pachmarhi situated in the same district has 79.61 inches as it is the part of the Plateau Region(1//).

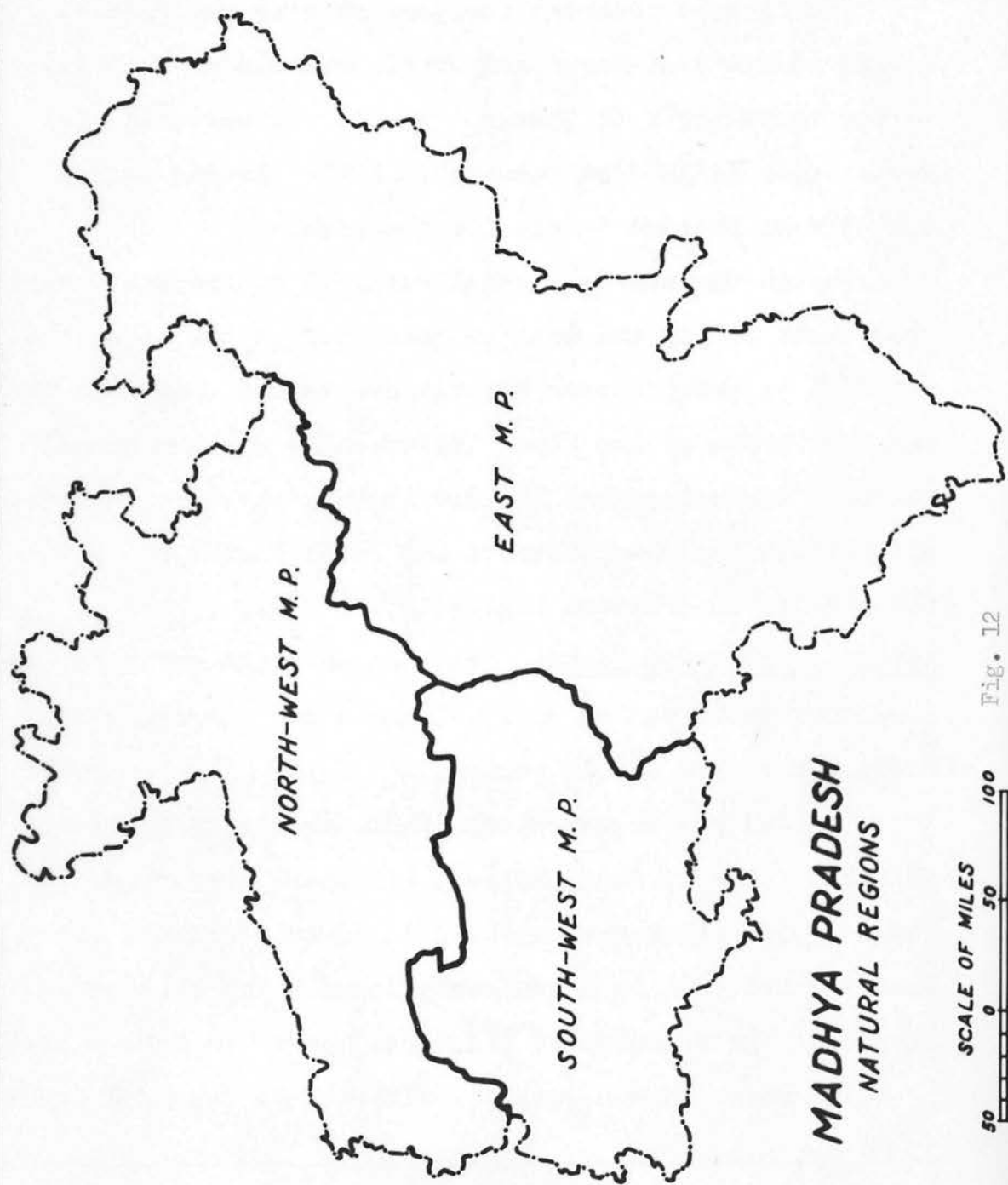
Rainfall and Agriculture. From the agricultural point of view, the state can be divided into 3 zones, namely the Paddy, Wheat and Cotton zones.

The Paddy zone comprises the districts of Bhandara, Balaghat, Chanda, Durg, Raipur, Bilaspur, Bastar, Raigarh and Surguja. Here the rainfall is 50 to 55 inches per year and the soil is brown heavy loams. The chief crop is paddy. Less important <sup>sugar</sup> are/cane, wheat and rabi oilseeds.

The wheat zone covers the district of Sagar, Jabalpur,

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(1//) Climatological Tables, op. cit., pp.275 and 415.



**MADHYA PRADESH**  
**NATURAL REGIONS**

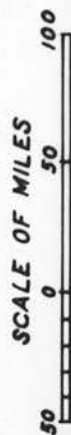


Fig. 12

Mandla, Hoshangabad, Chhindwara and Betul. The rainfall is between 36" to 50". The soil is a medium loam. The principal crops are wheat and other rabi crops with cotton and juar subordinate.

The Cotton zone comprises the districts of Amravati, Akola, Buldana, Yeotmal, Nagpur, Wardha, and Nimar. The rainfall is between 20 to 45". The soil is a heavy clay loam. Besides cotton as chief cash crop, other crops are juar, wheat, rabi oilseeds and Kharif pulses.

(1) Northwest,

(2) East, and

(3) Southwest.

1. Northwest Madhya Pradesh Division. This division comprises the districts of Sagar, Jabalpur, Hoshangabad, Nimar, Betul, Mandla and Chhindwara. Generally it consists of hilly country, situated at a considerable elevation which enjoys a comparatively more temperate climate than other areas of the state. The northern portion of this division is affected by the westerly wind of North India during the hot season.

Of the total area of 52,953,110 acres of the State, northwest Madhya Pradesh occupies 21,044,756 acres or 28.9%.



## Chapter II - Physical Features

### Section D - Natural Divisions of

#### The State

On the basis of physical features, geology, soil and climate, together with other natural characteristics such as forest and mineral resources Madhya Pradesh can be divided into 3 Natural Divisions, namely:-

- (1) Northwest,
- (2) East, and
- (3) Southwest

1. Northwest Madhya Pradesh Division. This division comprises the districts of Sagar, Jabalpur, Hoshangabad, Nimar, Betul, Mandla and Chhindwara. Generally it consists of hilly country, situated at a considerable elevation which enjoys a comparatively more temperate climate than other areas of the state. The northern portion of this division is affected by the westerly wind of North India during the hot season.

Of the total area of 82,983,110 acres of the State, northwest Madhya Pradesh occupies 24,044,386 acres or 28.9%.

The hilly country of this division has a thick deposit of basaltic lavas of Deccan Trap age (cretaceous). Along the Narmada Valley there is thick deposit of older alluvium.

Four distinct types of soils are found in this Division. Black clay soil, not very deep, is found in the districts of Sagar, Jabalpur and Nimar. Shallow clay loam prevails in the districts of Betul and Chhindwara, while deep heavy black soil covers Hoshangabad, and gravelly soil occurs in Mandla.

The variation of rainfall in this division is from 30.73 inches at Khandwa, to 50.06 inches at Hoshangabad and 57.55 at Jabalpur. The January average temperature is 76.7°F at Sagar, 77.4°F at Jabalpur, ~~75.1°F at Jabalpur~~ and 84.8°F at Khandwa. If the hill station Pachmarhi is excluded, Jabalpur and its neighbouring area is the coldest area in the whole of the State. The maximum monthly summer temperature is 103.6 at Seoni, 105.4 at Jabalpur and 106°F at Khandwa and Hoshangabad. Humidity is low which makes the hot weather bearable.

26.2% of the forest land of Madhya Pradesh is in the Northwest Division. Teak is the most important species in all the districts of this division. Sal is also found in

the districts of Mandla and Jabalpur. Of the total irrigated area of the State only 10.2% or 193,849 acres is in this division. Of the irrigated area, only 52,510 acres are irrigated by canals while the remainder by tanks and wells.

The net area sown is lower in Northwest Madhya Pradesh Division than elsewhere. Out of the total net area sown of 29,433,870 acres in Madhya Pradesh, 8,263,588 acres or 28.1% is in this division. The chief crop of this division is wheat (except in Nimar, where cotton is the main crop), followed by other rabi crops with cotton and juar subordinate.

From the point of view of mineral deposits, the Northwest is not as important as East Madhya Pradesh Division. Economically it is important for the large reserves of Vindhyan limestone for the utilization in lime and cement manufacture. The Vindhyan sandstone is being quarried extensively for building and architectural purposes. There is also good deposit of bauxite in the district of Jabalpur. Other minerals of less importance in this division are Gondwana coal, fireclays, ochres, steatite, soapstone, Gondwana clays, copper, corundum, felspar and gypsum.

As far as population is concerned the Northwest region is below average. With 28.9% of the area of the State, Northwest Division has 25.8%, or 5,490,410 persons of the population. The density of population of the State is 163 persons per square mile, while it is 149 persons in this division.

2. East Madhya Pradesh Division. This division is a diverse one, and wealthy in some parts, also contains some of the most backward and undeveloped tracts of the State with vast forest and untapped mineral resources. It covers about half of the area of Madhya Pradesh and includes the districts of Raipur, Bilaspur, Durg, Bastar, Raigarh, Surguja, Chanda, Bhandara and Balaghat. The area is 43,563,677 acres, or 52.5% of the total area of the State.

The plateau area of Surguja, Raigarh and Bilaspur, is composed of granite, gneisses and other metamorphic rocks. These are well known for the large deposits of bauxite. The plains of Balaghat and Bhandara districts are formed of slates, phyllites, schist, quartzites, hematite quartzites, gneisses and granites, belonging to the Sakoli and Chilpighat series of Archaean age. A basin along the valleys in Surguja, Kopa<sup>sc</sup>, Raigarh, and northeast Bilaspur is occupied by coal-bearing sandstones and shales of Lower Gondwana age. The basin of Upper Mahanadi extending over a large portion

of Durg, Raipur and Bilaspur, is formed of a thick series of quartzites, grey, pink and purple shales, limestones belonging to the Cuddapah formation. The plateau region of North Bilaspur and Durg is covered mainly by the Deccan and Trap lava flows and laterites. The large hilly tract of Chanda, Durg and Bastar are occupied by gneissic and granite rocks with quartzites, schists, phyllites, banded hematite quartzites, here and there. The plains of the district of Balaghat and Bhandara are covered with slates, phyllites, schists, quartzites, hematite quartzites, gneisses and granites of the Sakoli and Chilpighat series of Archaean age. A vast tract of this division is occupied by a thick cover of black to brown loamy soil washed from the Deccan trap plateau to the west and north.

Two types of soil are mainly found in this division. One of them is red sandy soil. It occurs principally south of Raipur and east of Chanda as far as Bastar, and again over the whole of the Surguja plateau. It carries either extensive forests mostly of Sal or else is utilised for cultivating rice. The other is black sandy soil. It occurs mostly south of Jabalpur and east of Nagpur as far as Raigarh. It is utilised for cultivation of rice, as the rainfall is fairly heavy in this area. The Sal forests of Mandla, Balaghat, Durg and Bilaspur occur over

these soils. Besides these, there are small patches of deep black soil in the districts of Bastar and Chanda.

In a division of such varying orographical features, the climatological conditions also vary from place to place. The annual rainfall varies between 43" at Gandai (Durg district) to 54" at Pendra (Bilaspur district), 63" at Jagdalpur (Bastar district) and 69" at Dhuti (Balaghat district). The mean max. temperature of the coldest month of the year (December) varies between 75°F at Pendra to 85°F at Chanda. The mean max. temperature range during the hottest month of the year (May) is 101°F at Jagdalpur to 109°F at Chanda.

The highest area under forest land is in this division. Out of the total forest land of the State, 52.5% is in the eastern division. All the three types of forests are found in the East Madhya Pradesh Division - mixed, teak and sal forests. Mixed forest occupies a large block east of Nagpur as far as Chanda in the south, Raipur in the east and Balaghat in the north. This is the only area in Madhya Pradesh where mixed forest is found. The important species are timber trees, polewood, fuel species and other useful species, such as mahua, achar, harra jamun, etc. and bamboos. Teak forest is in Chanda and locally in parts of Balaghat, Mandla, Raipur, Bilaspur Kankar and Bastar. The important sal forests are found



in Balaghat, Bilaspur, Raigarh, South Raipur and Bastar. Korea, Surguja and Kankar have sal of poorer quality.

The highest irrigated area is to be found in this division. Out of the total area of 1,907,067 irrigated in M.P., the share of East Madhya Pradesh is 1,598,144 acres, or 83.8%. Most of this is tank irrigation. The net area sown in this division is 42.1% of the total net area sown in the State. The main crop of the division is rice. The other crops of less importance are sugar cane, wheat, rabi oilseeds, millets, pulses and kharif oilseeds.

This division is a part of the northeast plateau sub-region, which consists of the Chota Nagpur division and is the most highly mineralised area in the whole of the Indian sub-continent. The division possesses large reserves of iron-ore, manganese ore, copper, bauxite, coal, limestone and mica. The less important minerals found in this division are kyanite, chromite, wolfram, tantalite, pitchblends, vanadiferous magnetite, asbestos, graphite, clays, etc.. Though highly mineralised is this region, but still under-developed is the area.

Half of the population of Madhya Pradesh lives in this division though the population distribution is most uneven. 48% of the people of the State live in this division, while 25.8% in the northwest and 26.2% in the southwest. Though the population is highest, the density

is second to southwest. The density of population of this division is 149 persons per square mile.

3. Southwest Madhya Pradesh Division. This is the most developed part of the State with its textile and other industries and rich cotton cultivation and a high density of population. The division includes the districts of Amravati, Buldana, Akola, Yeotmal, Wardha and Nagpur. With an area of 15,375,047 acres, i.e. 18.6% of the total area of the State, this division is the smallest of all the three divisions of the State.

It consists of flat-topped plateau and hills made up of basaltic rocks of Deccan trap age. It is capped with ferruginous and aluminous laterite. The main geological formation is Deccan Trap in all the six districts of the division. There are some alluvium deposits in the river basins in the districts of Buldana, Akola and Amravati. A small tract of metamorphic rocks of Archaean age occur in the Nagpur district at the northeast corner.

The main soil of the division is black clay soil, not very deep, with some patches of deep heavy black soil in the southern part of the district of Amravati. Black clay soil is the typical 'regur' or the black cotton soil derived from the trappean rocks. The heavy black soil is the alluvial deposits in the valleys of the rivers of this division.

The mean annual rainfall varies between 32" in Akola to 49" in Nagpur. The mean maximum temperature of the coolest month of the year (December) is 84°F at Nagpur and 86°F at Akola while the mean maximum temperature of the hottest month of the year (May) is 108°F at Akola and 109°F at Nagpur.

Southwest Madhya Pradesh division has the lowest area and percentage of the forest of the State. Only 15,375,047 acres, or 18.6% of the total forest area of the State is in this division. Teak forests occur to a greater or lesser extent in Nagpur, Wardha, Amravati and Yeotmal. This is the only type of forest of economic importance found in this division.

Southwest Madhya Pradesh is conspicuous by the absence of canals. Only about 9,000 acres of land is irrigated by canal in Nagpur, and about 300 acres in Yeotmal in the whole of the division. Tank irrigation is also negligible. Whatever irrigation is done is by means of wells. Only 6% of the total irrigated area of Madhya Pradesh is in this division.

The net area sown in this division is 8,778,333 or 29.8% of the total net area sown in the State. The chief crop is cotton. Other crops of minor importance are juar, wheat, rabi oilseeds, kharif pulses and bajra.

The division is poor in minerals, although the laterites in several places are rich enough in alumina to provide bauxite. The basaltic rocks of the Deccan trap age are capped with ferruginous and aluminous laterite.

(Figs. 13 and 14)

The distribution of population is comparatively most uniform in the Southwest Madhya Pradesh Division which has also the highest density of 231 persons to a square mile. Of the total population of the State, 5,557,763 persons, or 26.2% live in this Division. This is the most developed part of the State and is also the most urbanised area in Madhya Pradesh. The urban area in this Division is the largest, as also is the average urban density per square mile, which is as high as 9,431. Southwest Madhya Pradesh Division contains the city of Nagpur, in which the urban density is 54,768 <sup>persons</sup> to a square mile. This compares with Jabalpur in the Northwest Division, where the average density is only 8,107 persons per square mile.

It is forbidden to cut living trees. In short, in all the great religions of the world religious sanctity in a greater or lesser degree has been accorded to the tree. It is also a fact that in India from time immemorial the shady groves of trees have always served the community in outdoor activities as a meeting place for the elders of the village or as a centre for celebrating a community festival.

The traditional centre of Indian culture was once covered with the impenetrable jungles of the Vedic and Epic days.

### Chapter III - Forest and Forestry

Some take pride in calling it a forest civilization.

(Figs. 13 and 14)

During the Brahminical and Buddhist periods there were

forests over a considerable part of India. However, these

Trees have always had importance in India, and perhaps no more so than today when they are in short supply. Among Hindus a shady tree could acquire sanctity and become an object of worship. Amongst the Budhists it early became an object of sanctity as it served the Budha's Nirvana (enlightenment) and provided the pleasure swings of the village girls in spring fetes. According to Jewish tradition, there is a planting ceremony at the birth of a child. On that occasion girls perform tree planting dance. This function is performed with all religious sanctity. The Christians used symbols that they acquired in Palestine from Jews and took them to other countries, especially in the west. In Islam it is forbidden to cut living trees. In short, in all the great religions of the world religious sanctity in a greater or lesser degree has been accorded to the tree. It is also a fact that in India from time immemorial the shady groves of trees have always served the Community in outdoor activities as a meeting place for the elders of the Village or as a centre for celebrating a community festival.



The traditional centre of Indian culture was once covered with the impenetrable jungles of the Vedic and Epic days. Indian civilization is said to have originated in the forest. Some take pride in calling it a forest civilization.

During the Brahminical and Buddhist periods there were forests over a considerable part of India.(1) However, these were gradually to disappear. Rebbentrop says that "during the constant invasions of new nomadic tribes culminating in the Mohomedan conquest of a large part of India, the hills and the country at large were denuded to yield pasture for the extensive herds of the Central Asian invaders." (2) The aborigines and tribal people, who were pushed into jungles by invaders from Central Asia, had to resort to shifting cultivation. This also resulted into the shrinkage of forest area. Of Madhya Pradesh also "during the earlier period of the present (British) administration, shifting cultivation (Kumri) was practised to a large extent in the Central Provinces, and several thousand of square miles were thereby laid barren year after year."(3)

In spite of all its religious sanctity, the forests shrunk in the past. This may be attributed to the fact that

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(1) Rebbentrop, B - Forestry in British India, Calcutta 1900, p. 36.

(2) Ibid., p. 36.

(3) Ibid., p. 49.



the forest was treated as supplier of shelter, fuel, fruits and wood. It is only during the recent past that the importance of forest on geographical and ecological grounds has been realized and since then attempts have been made to rectify the mistakes committed in the past. Although in India "the area occupied by forests is much less now than it was some centuries ago,..."(1) M.P. is fortunate in having a large area still under forest.

In the beginning of the present century the forests of M.P. were supplying the local demand for timber, fuel, bamboos and fodder.(2) In the case of Berar too, the same was the case in the beginning of the present century.(3)

Factors influencing forests in M.P. climate is the most important single factor in M.P. in determining the type of forests located in different areas. Among the climatic factors, rainfall is the most important. Since most of the rainfall (nearly 90%) comes during the rainy season (June to September) and is followed by hot dry weather, active growth is followed by quiescence and the general pattern of forest is that of deciduous, fire-resistant species. Soil composition

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- (1) Ribbentrop, B - Forestry in British India, Calcutta 1900, p. 38.  
 (2) The Imperial Gazetteer of India, Provincial Series C.P., Calcutta 1908, p. 55.  
 (3) The Imperial Gazetteer of India, Provincial Series Berar, Calcutta 1909, p. 35.

is significant in determining the presence or absence of certain types of species. Teak is preponderant on trap soil while it is absent on laterite. Similarly, babul is found on stiff clayey soils and bhirra on sandy soils. Subtypes of forests depend on the variation in soil conditions and biotic factors. Selective fellings, grazing and fires are other factors responsible for subtypes. The role of topography is less important, except in so far as it affects the rainfall. The elimination of good fodder grasses in certain areas due to grazing and extermination of bamboo in other areas owing to over-felling are worthy of note.

Area under forests. For a tropical country, as India is, it is vital to keep a certain percentage of land under forest. Realizing its importance in the national economy of the country, the National Forest Policy of India enunciated in 1952 a policy which lays down that

"India, as a whole, should aim at maintaining one-third of its total land area under forest. As an insurance against denudation a much larger percentage of the land, about 60% should be kept under forests for their protective functions in the Himalayas, the Deccan and other mountainous tracts liable to erosion. In the plains, where the ground is flat and erosion is normally not a serious factor, the proportion to be attained should be placed at 20%, ..."(1)

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(1) The National Forest Policy of India, Ministry of Food and Agriculture, Delhi 1952, p. 34.

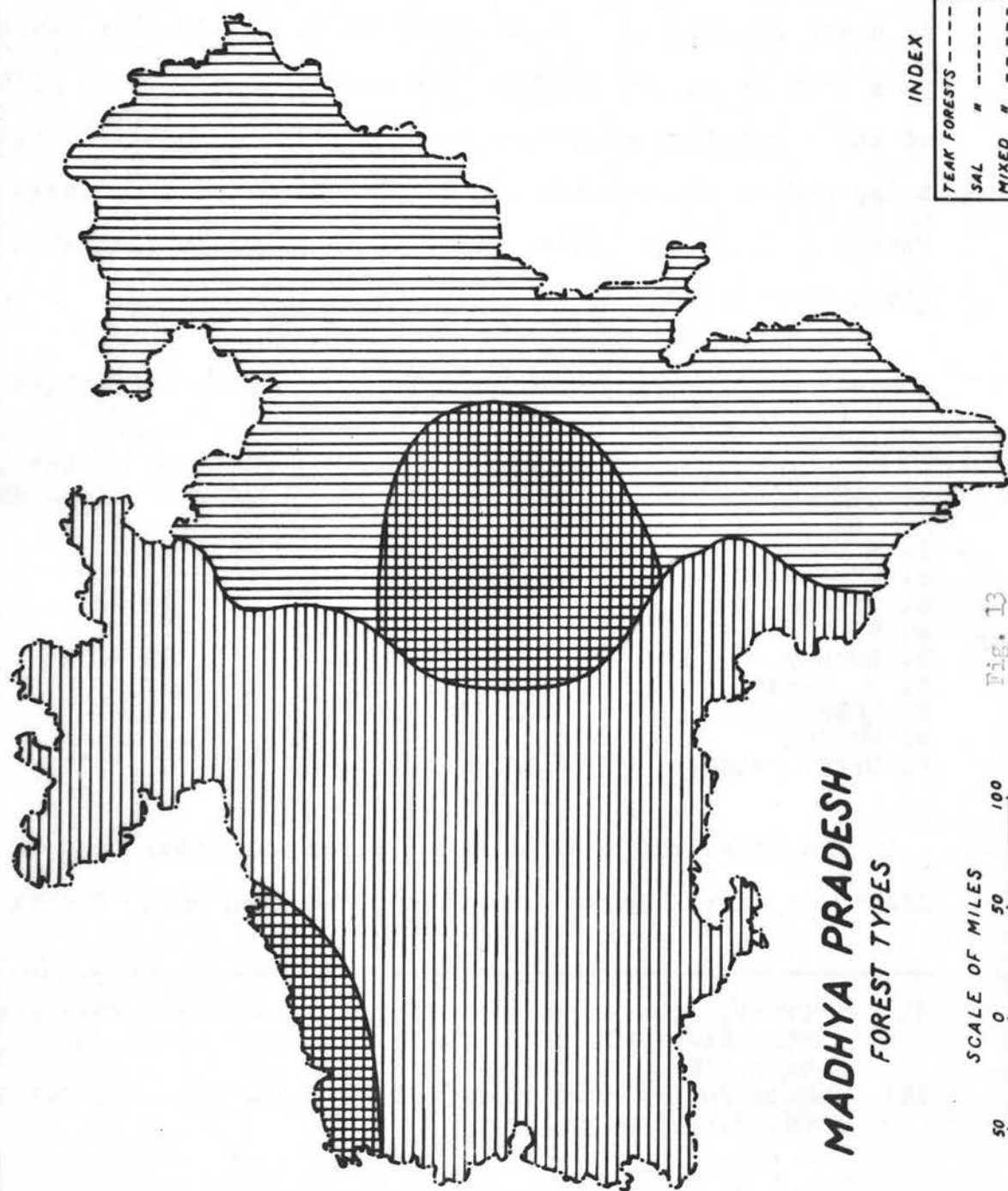
At present about 22.3% of the total land area of the Union is under forest.<sup>(1)</sup> Fortunately in Madhya Pradesh there have been extensive forests from ancient times. In spite of their ruthless exploitation and shifting cultivation, even today Madhya Pradesh has the highest area and percentage of forest land in the Indian Union as is shown in the table given below.<sup>(2)</sup>

Table No. 8 showing the area under forest and percentage of forest area to state area in 1951-52.

<u>State</u>	Area under forest (Sq. miles)	Percentage of total forest area to State area
1. M.P.	66,851	51.30
2. Assam	30,391	35.75
3. Orissa	20,617	34.28
4. Bihar	13,652	19.00
5. Bombay	20,314	18.22
6. W. Bengal	5,256	17.08
7. Madras	20,832	16.30
8. Punjab	5,104	13.60
9. Uttar Pradesh	13,413	11.82

The above table shows that out of the total area of 130,274 square miles of the State, the area under forest is

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- (1) Trivari, K.M. - Forestry in the Second Five Year Plan, Indian Forester, Vol. 82, No. 3. March 1956, Dehra Dun n.d. p. 130.
- (2) Indian Forest Statistics, 1950-51 and 1951-52, Delhi 1955, Table No. 1.1.



# **MADHYA PRADESH FOREST TYPES**

SCALE OF MILES  
0 50 100

## **INDEX**

TEAK FORESTS ---

SAL " ---

MIXED " ---

Fig. 13

66,851 sq. miles, or 51.30 of the total. At the first sight it looks as though the area under forest would be adequate to meet all the demands of the State. But Dutta, Conservator of Forests in Madhya Pradesh is right when he says that

"the hilly nature of a considerable portion of the state, deficiency of forests in the large plains of Chhattisgarh, Nagpur and Berar and the demands of other States, clearly points towards the necessity of more forests, particularly in the cultivated plains."(1)

Types of forests. The vegetation during ancient times seems to have been a mixed deciduous forest. The commonest species at that time would have been saj, Dhaora, Lendia, Bija, Mahua, Tendu, Bamboo, etc. (2) Later on

"An aggressive invasion of the light-demanding, drought-hardy, fire-resistant and vigorous Coppecer Teak has given Teak-predominant forests in the western half of the State and in particular on trap soils. Similarly, Sal which is a gregarious moisture-loving species, has colonised large areas in the east of the State. The intermediate zone where neither Teak nor Sal predominates, still contains the original mixed forests somewhat modified due to biotic factors."(3)

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- (1) Datta, R.N. - Forestry in M.P., The Indian Forester, Vol. 80. No. 12, December 1954, Dehra Dun n.d. p. 817.
  - (2) Report of the Forest Policy Committee, M.P., Nagpur 1952, p. 22.
  - (3) Ibid., p. 22.



The forests of Madhya Pradesh can be divided into 3 main types, (Fig. 13) namely

1. Teak forests
2. Sal forests
3. Mixed forests

All the above forests have bamboos in many areas, in greater or lesser amount, which are of great economic importance. Besides the above 3 main types, there are some Sub-types which are also of great economic importance.

1. Teak forests. Teak is "valuable for its termite-resistant qualities" (1). Most teak (*Tecona grandis*) forests are mixed forests in which teak predominates. Mainly they occur in patches in some districts of the eastern half. The districts in which they are found in greater or lesser degree are Jabalpur, Sagar, Hoshangabad, Betul, Seoni, Chhindwara, Nagpur, Wardha, West Berar, Amravati, Yeotmal and Chanda. Locally they are found in parts of Balaghat, Mandla, Raipur, Bilaspur, Kanker and Bastar. The teak forests are located in areas where the rainfall is from 30 to 75 inches but in exceptional cases they are also found in areas having 100 inches of rainfall. Teak grows on a variety of geological

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(1) State, O.H.K. - India and Pakistan, London 1954, p. 69.



formations but conspicuously on

"trap, limestone, gneisses, mica-schists, sandstone, conglomerates, shales and clay, but is usually absent on quartzites and laterites."(1)

It is absent on stiff black-cotton soil.(2) The Report of the Forest Policy Committee says that

"on trap, and in comparatively drier localities, its proportion in the crop is very high but its size is small. On other formations, wherever soil-moisture conditions are favourable, it attains large dimensions, but its proportion in the crop is rather low.(3)

The best teak forests are in parts of the districts of Hoshangabad, Amravati, Chanda and Bastar.(4)

2. Sal Forests. The Sal (*Shorea robusta*) forests are mainly confined to the eastern half of the State. In the opinion of Champion "the Sal forests have a facies of their own which is due to the undisputed dominance of the one gregarious species."(5)

(1) Report of the Forest Policy Committee, op. cit., p. 23.

(2) Ibid., p. 23.

(3) Ibid., p. 23.

(4) Indian Forester, Vol. 80. No. 12, op. cit., p. 818.

(5) Champion H.G. - A preliminary Survey of the Forest types of India and Burma, Indian Forest Records, New Series, Silviculture, Vol. 1. 1936, Delhi 1936, p. 76.

(1) Champion H.G. - A preliminary Survey of the Forest types of India and Burma, Indian Forest Records, New Series, Silviculture, Vol. 1. 1936, Delhi 1936, p. 76.

(2) Report of the Forest Policy Committee, op. cit., p. 23.

Champion says that

"Sal is very generally more aggressive than any of its associates and competitors in natural gregarious habit, Coppicing power, resistance to burning, regeneration, under-burning and grazing, adaptability to soil and site conditions, and longevity; ..." (1)

The areas of more importance for Sal forests are in the districts of Mandla, Balaghat, Bilaspur, Raipur, Bastar, Surguja and Raigarh. Except Mandla, the other districts lie in the natural division of East M.P. Mandla is a hilly country situated in the N.W. Madhya Pradesh. It has gravelly soil. Surguja, Raigarh and Bilaspur are plateau area while Balaghat and Raipur plain area. Mandla has gravelly soil while others possess red sandy soil. The rainfall of the area is above 60" per annum. The poorer quality Sal is found in Jabalpur, Korea, Surguja and Kanker. The species mentioned under mixed forests are also found in these forests, but Sal predominates. Bamboo is found in many areas of these forests.

3. Mixed Forests. The mixed forests are found in an extensive area which extends from "east of Nagpur, extending as far as Chanda in the south, Raipur in the east and Balaghat in the north." (2)

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- (1) Champion H.G. - A preliminary Survey of the Forest types of India and Burma, Indian Forest Records, New Series, Silviculture, Vol. 1. 1936, Delhi 1936, p. 76.  
 (2) Report of the Forest Policy Committee, op. cit., p. 22.

From west of the Pachmarhi Hills to Itarsi and Amla there is another extensive area of mixed forests. The more important and common species found in the mixed forests are:

1. Timber trees - Teak, Saj, Bija, Semal, Shisham, Haldu, Tinsa, Salai, etc.
2. Pole wood - Teak, Saj, Tendu, Dhaman, Bhirra, Kari, Dhaora, etc.
3. Fuel Species - Saj, Dhaora, Babul, Tendu, Aonla Hewar, Arjun, Moyen, etc.
4. Other useful species - Malwa, Achar, Harra, Khair, Palas, Kusum, Bahera, Aonla, Bel, Ber, Jamun, etc. and bamboo. (1) \*

4. Sub-types. There are some sub-types which are of great economic importance. Different species predominate in different localities. The more important species are -

1. Palas - There are large patches in Bhandara division and elsewhere. Lac is cultivated on these trees.

2. Salai - More or less on dry hill tops mostly in Nimar, Nagpur, Wardha, Seoni and Yeotmal.

3. Khair - This is found in large quantities in Hoshangabad, Sagar, Jabalpur and Korea. Exploitation is for

(1) Report of the Forest Policy Committee, op.cit. p.23.

\* The above are the Indian names of the species. The technical names given by Datta are *Terminalia tomentosa*, *Pterocarpus marsupium*, *Balbergea latifolia*, *Adina Cordifolia*, *Diospyros melaoxylon*, *Anogeissus latifolia*, *Tectona grandis*, *Bombax malabaricum*, *Boswellia serrata*, *Odina wodier*, *Embllica officinalis*, *Madhuca latifolia*, *Terminalia belarica*, *Schleichera*, *Oleosa*, *Acacia arabica*, *Acacia Catechu*, etc. Besides, bamboos are also found.(2)

(2) Report of the Forest Policy Committee, op.cit., pp.817 and 818.

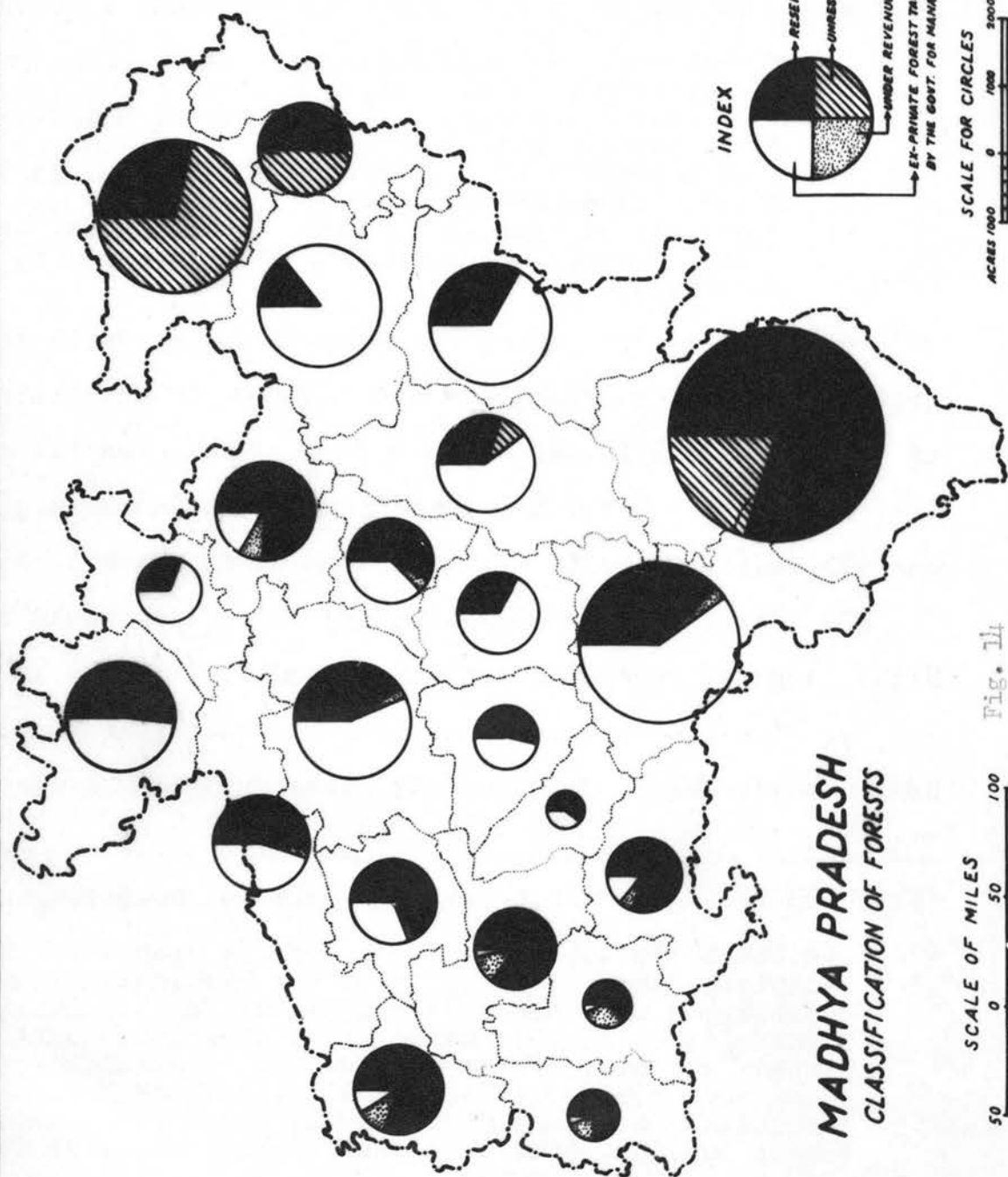


Fig. 14

the extraction of Katha (catechu).

4. Berra - This grows on sandy soils in several localities.

5. Ghont - There is extensive forest in the district of Sagar. Lac is cultivated on them.

6. Anjan - Anjan is found in large patches in Nimar, along the slopes of the Pachmarhi Hills, in West Berar, and in the southern part of the south Chanda.

7. Garari - It is found in all the three main types of forests, especially in south Chanda, Bhandara, and south Raipur.

8. Harra - It is found in abundance on the higher plateaus of Balaghat and Mandla. Large quantities of its nuts are collected as they form an important tanning material.

Classification of forests (Fig. 14): There are two classifications of the forests in India. One is functional classification and the other is legal. The functional classification is based on the fact that the forest is to be managed in such a way as to achieve maximum efficiency with regard to the main function assigned to it, otherwise every forest functions for more than one purposes. This classification has nothing to do with legal classification as defined in the Indian Forest Act XVI of 1927. The legal classification is based on the degree of control exercisable in it.



1. Functional classification. In 1894, the Government of India classified the forests of India into 4 heads, namely

1. Forests essential on climatic or physical grounds,
2. Forests which are suppliers of valuable commercial timbers,
3. Minor forests, producers of inferior type of timber, and
4. Pastures and grazing lands.(1)

After half a century, in 1944 under the Post-war Forest Policy, another classification was made, namely,

1. Protection forest,
2. Timber forest
3. Minor forest, and
4. Pasture forest (2)

The above classification was also adopted by the Forest Policy Committee of Madhya Pradesh (3)

On May 5, 1952, the Government of India approved its National Forest Policy. According to that the forests of India, irrespective of the consideration of ownership, ~~has~~ have been classified as

1. Protection forest,
2. National forest,
3. Village forest, and
4. Freelands (4)

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- (1) Report of the Royal Commission on Agriculture in India, Bombay 1928, p. 257.
  - (2) Howard, Sir Herbert - Postwar Forest Policy for India, Delhi 1944, p. 17.
  - (3) Report of the Forest Policy Committee, op. cit., pp 41 and 42.
  - (4) The National Forest Policy of India, Delhi 1952, p. 28.



It is proposed to deal with these functional classifications briefly to give a picture of the present situation. There is an important and far reaching change in connection with the private forests. Before 1952, the Government forests were only classified and protected under the Forest Act. Private owners, with a much larger share of forests, were free at large. The result had been exploitation with depletion. Now all forests have been classified without consideration of ownership. On the abolition of the Madhya Pradesh Proprietary Rights, progressively all private forests have been taken over for management by the Forest Department. The present position is that no forest in Madhya Pradesh is under private ownership.(1) The immediate effect of the abolition of the Proprietary Rights was that all the owners tried to make the maximum advantages of the forest which were to be taken from them, with the result that the Forest Department got them in still worse condition.

1. Protection forests are those whose preservation or creation is essential on physical and climatic grounds. Such types of forests are to be created or preserved on hill slopes, banks of rivers and other places to check erosion. The main

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(1) Indian Forest Statistics, op. cit., Table 1.1, p. 3.

consideration should be their protective effect on soil and the physical and climatic factors of the area. Wherever possible, there may be the production and exploitation of timber but not at the expense of the primary object.

2. National forests. The main purpose of these forests is to meet requirements of defence, communication and industry and other users of public importance. All timber forests are included in this category. They are the national forest wealth. The interest of the nation is to be the main consideration in their maintenance and management. National self-sufficiency in forest produce has been regarded as the vital policy. Cultivation is not to be allowed to encroach upon these forests. The food problem may be solved by other means, such as intensive cultivation, but not by weakening national wealth of such vital importance.

3. Village forests are popularly known as fuel forests. The main purpose of these forests is to supply small timber for housing and agricultural implements, firewood, leaves for manure and fodder, fencing thorns, grazing and edible forest products. The Village forests will go a long way to solve agricultural problems in India directly and indirectly. The direct benefits have been mentioned in the beginning and they are too obvious to be enumerated here. Indirectly, when they will supply fuel to the cultivators at a reasonable price, cow dung will be spared for manure.

4. Freelands are in the interest of the rural economy of the regions, where agriculture is the mainstay. Their main purpose is to ameliorate the physical conditions of the country. According to the Land Transformation Programme of the Government of India it is proposed to plant 300 million trees within 10 years time.(1) But it has been realized that "this number is very far from about 2,000 crores (20,000 million) of trees, which would be necessary to restore the hydrological nutritional balance of the country," (2) Owing to the lack of funds and trained personnel it is not possible for the State Forest Departments to undertake such a gigantic scheme. To achieve some progress in tree plantation a mass campaign for tree plantation was started in 1950 by the then Union Food Ministry.(3) It is known as Vana Mahotsava (National tree plantation festival). The object has been to make people "tree conscious". Some progress has been achieved through this festival which takes place all over India every year in the month of October. \*

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(1) The National Forest Policy of India, op. cit., p. 32.

(2) Ibid., p. 32.

(3) India At A Glance, Calcutta 1954, p. 263.

\* Vana Mahotsava. Van means forest, Maha is great and Utsava means festival. Vana Mahotsava means Great Forest Festival or Great Festival of the Forest. It was in 1950 that  
(contd. next page)

Legal classification of forests. To give a legal status to forests a special classification has been made. It does

(contd.) K.M. Munshi, then Minister of Agriculture, Government of India launched a campaign for the plantation on nation wide scale. To give importance to it, it has been elevated into a sort of national festival. To overcome the shortage of forests it has been proposed to plant 300 million of trees in Indian Union in 10 years time./1/ Owing to the lack of sufficient fund and inadequacy of trained staff, this step has been taken up. Plantation is done along road sides, canal banks, railways sides, around Villages and in other localities. In Madhya Pradesh this festival has given some impetus for plantation along road sides and in some other localities suitable for the purpose. But canal banks suitable for plantation in Madhya Pradesh is small. Still Irrigation Department is conserving some tree growth along canal banks. Datta says that "lands along the railway lines have not yet received sufficient attention."/2/ The progress achieved in this direction is not good. K.B. Lal, Acting President, Forest Research Institute and Colleges Dehra Dun, says "that the present criticism of Vana Mahotsava is based on the rather low percentage of Survivals, ..."/3/ This statement can be substantiated from the figures given in the Indian Forest Statistics, 1950-51, and 1951-52. The result of 1951 Vana Mahotsava had been that out of a total number of 34,812,000 trees planted, only 17,690,000 trees survived, i.e. 50.8% only./4/ As far as Madhya Pradesh is concerned, the progress of this festival can be envisaged from the table given below./5/

(contd. next page)

- /1/ Munshi, K.M. - Land Transformation - A Philosophy and a Faith, Delhi 1951, p. 14.
- /2/ Datta, op. cit., p. 820.
- /3/ Mohan Lal, K.B. - Speech delivered on Vana Mahotsava Day, Indian Forester, Vol. 80, No. 9. September 1954, Dehra Dun, n.d. pp 569 and 570.
- /4/ Indian Forest Statistics, op. cit., Appendix II, p. 192.
- /5/ Ibid., p. 192.

not take functions into consideration. Under Act VII of 1878 as amended by Act V of 1890 and Act XII of 1891, there

(contd.) above classification was revised under the Indian

Table No. showing the results of 1951 Vana Mahotsava in M.P. (in thousands)

The present legal classification is, as given below.

<u>Number of trees planted</u>			<u>Number of trees survived</u>			<u>% age of Survival</u>
Fruit bearing trees	Other trees	<u>Total</u>	Fruit bearing trees	Other trees	<u>Total</u>	
1,467	3,013	4,480	559	1,191	1,750	39.1

The above are the achievements of the Forest Department only. But taking all sources into consideration "in the first Vana Mahotsava of 1950 about 4 crores (40 million) of trees were finally assessed as having been planted of which about 25% are reported to have survived"/1/. Further it says that "the Second Vana Mahotsava of 1951 evoked equal enthusiasm and about 4 crores (40 million) of trees were planted."/2/

offences that is not prohibited".(2) In Village forests "the State Government may assign to any Village Community the rights of Government to or over any land which has been constituted a reserved forest."(3)

(1) Report of the Royal Commission on Agriculture in India, op. cit., p. 238.

(2) Report of the Royal Commission on Agriculture, op. cit., Appendix V, p. 303.

/1/ The National Forest Policy of India, op. cit., 21.

/2/ Ibid., p. 21.



were three classes of forests, namely

1. Reserved forests,
2. Protected forests, and
3. Unclassed forests (1)

The above classification was revised under the Indian Forest Act XVI of 1927 as modified up to the 15th June, 1951. The present legal classification is, as given below.

1. Reserved forests,
2. Village forests, and
3. Protected forests.

The distinction between "reserved" and "protected" forest was given under the Government of India Circular No. 22-F, dated 19th October 1894. According to that circular "the chief difference is that, speaking broadly, in a reserved forest everything is an offence that is not permitted, while, in a protected forest, nothing is an offence that is not prohibited".(2) In Village forests "the State Government may assign to any Village Community the rights of Government to or over any land which has been constituted a reserved forest."(3)

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- (1) Report of the Royal Commission on Agriculture in India, op. cit., p. 258.
  - (2) Report of the Royal Commission on Agriculture, op. cit., Appendix V, p. 703.
  - (3) The Indian Forest Act, op. cit., Chap. III, Section 28, p. 14.



The Primary uses of Forest Resources. Madhya Pradesh is rich in forest resources, although there has been ruthless and unscientific exploitation in the past and much of the resources have been depleted. Important commercial products of the forests of the State are teak, sal and other timbers in large quantities, charcoal, bamboos, firewood, 'bidi' leaves, harra, Katha, rusa grass, gums, edible fruit and flowers, oil producing seeds, tan stuffs, fibres and flosses. Hides and horns, bones and fish are among the animal products of the forest. Lac, honey and wax, Kosa and silk are the production from forest insects.

The above are some of the direct benefits, and, it will be seen that many industries based on forest products can be developed in the State. But there are also indirect benefits, which are, nevertheless, as important as direct ones. Forests preserve the physical features, moderate extremes of climate, check the speed and force of flow of rain-water, and thus minimise soil erosion and regulate the flow of streams.

Timber - 1. Teak. This is the most important timber of the State. Large timbers are exported while poles and small timbers are mostly consumed locally. The main areas from which these timbers come are the forests of Bori in Hoshangabad, Allapilli in south Chanda and Malaghat in Amravati. Timber is brought by the Forest Department to its

own depots and there it is auctioned in lots. Mostly it is sold as logs or rough squares. There are small departmental mills in which logs of inferior quality are sawn and sold in lots at depots. There is much wastage in the methods of felling, conversion and sale. This can be improved a lot. At present timber is not graded. It will fetch higher price if it is graded. With the industrial development of the country, there will be greater demand for teak. But the present position is that the teak forest is declining owing to past ruthless fellings. The Forest Department should select suitable localities for large plantation of teak.

2. Sal. In India sal is more important than teak.(1) It is also more gregarious than teak. It is the main species of the eastern half of the State. The Forest Department exploits the large trees for railway sleepers while contractors exploit the smaller trees.

3. Semal. This forms an important match-wood. There is a high demand for this species. The cut has exceeded the annual replacement.(2) It is one of the species commonly used for the manufacture of plywood in India.

(1) Spate, op. cit., p. 69.

(2) Report of the Forest Policy Committee, M.P., op. cit., p. 86.

The wealth 4. Bija, haldu and shisham. They are very valuable timbers for constructional work and for the making of furniture. There is much demand for them. The output of these species is not very large. (1) Haldu (*Adina cordifolia*) is good for making plywood of commercial grades, but during seasoning veneers may split and crack badly. Plywood made of shisham (*Dalbergia latifolia*) is extremely handsome, strong and durable. is a soft wood. Previously

it was used 5. Saj. There are large quantities of saj available in the State. This wood requires kiln-seasoning, but such facilities are not available in the State. The result is that it is either sold at a low price or converted into charcoal.

the Government 6. Papra. It is a good turnery wood and fetches a high price. Since it is a very slow growing timber, the supplies are limited. encourage this industry of national

importance. 7. Babul. It is used as agricultural timber, if it is straight. In that case it fetches a high price. The bark of babul is used as "the most important tanning material of northern India." (2) It is obtained as a by-product when the trees are felled for some other purposes. forests very large quantities of charcoal are being manufactured

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(1) Report of the Forest Policy Committee, op. cit., p. 86.

(2) The wealth of India, Department of Scientific Research, Govt. of India, Vol. I, Delhi 1948, p. 6.

(2) Ibid., p. 5.

The Wealth of India says that "leather made from babul bark is firm and durable, though harsh and dark coloured. Babul is very good for heavier leathers, but is not suitable for kips, half-tanned hides, ..." (1) Further it says that "afforestation around tanning centres has not kept pace with depletion, in spite of great warnings given as early as 1901, and repeated ever since." (2)

8. Salai. This is a soft wood. Previously it was used mainly for cheap packing cases. For that purpose it was extensively utilised during the last war. Now it is used for making mechanical pulp in a newsprint mill which has been put up at Chandni in the district of Narmar by the National Newsprint and Paper Mills Limited (NEPA). It is the Government of India enterprise. The State Government have guaranteed the Salai requirements of the Company at a concessional rate to encourage this industry of national importance. Another industry in which salai can be utilised is plywood. It is suitable for the manufacture of plywood of second grade.

Charcoal. Hardwood, not saleable for timber, is used for the manufacture of charcoal. In the Government reserved forests very large quantities of charcoal are being manufactured

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(1) The Wealth of India, Department of Scientific Research, Govt. of India, Vol. I, Delhi 1948, p. 6.

(2) Ibid., p. 6.

Open air methods are employed in the conversion of charcoal. The results are a low yield per ton of wood and complete loss of volatile matters. The possibility of making charcoal in portable closed retorts and collecting the wood-tar and pyroligneous acid should be examined by the State Government. Almost the entire quantity is exported outside the State.

Bamboos. There are two species found in the forests of Madhya Pradesh - Katang (*Bambusa Arundinacea*) and Bans (*Deudro-Calamus Strictus*). Katang is too thorny and occurs only in the remote moister forests. Bans is of great commercial importance. There are a number of purposes for which Bans is used, viz., paper making, scaffolding, roofing, walling, matting, lathis, fishing rods, umbrella-handles, tent-poles, basketry, etc. It is the raw material for paper making, for which it is excellent. For the manufacture of one ton of finished paper, the main raw materials required are about  $2\frac{3}{4}$  tons of air-dried bamboo and about 5 tons of coal.(1) The National Newsprint and Paper Mills Limited at Chandni, and the Ballarpur Paper and Straw Board Mills Limited at Ballarshah, have been floated recently. They will utilise 30,000 and 20,000 tons of air-dried bamboos per year, respectively. The Government of Madhya Pradesh have guaranteed the supplies of bamboos at concessional rates as

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(1) Report of the Provincial Industries Committee, C.P. and Berar, Nagpur 1945, p. 53.

the State owns the majority of shares of both the companies. To meet the demand of bamboos and salai wood by the paper mills of the State, the Forest Department has decided to bring 1,500 acres of land under plantation every year.(1) Large quantities of bamboos are being utilised for making orange baskets. When cold storage facilities are developed the orange industry may expand and with it the demand for bamboos for orange baskets will increase.

Bidi leaves. The Tendu (*Deospyros melanoxylon*) leaves are of commercial value. The leaves are used as wrappers for tobacco to make 'bidis' or Khaki cigarettes. The quality and quantity of leaves can be increased by cultural treatment, but no attempts have been made yet in this direction except in the Raigarh tract.(2) The future of tendu leaves does not seem bright. With the rise in the standard of living, the people will give up cheap "bidi" smoking and take up better smoking, unless and until the quality of tendu leaves and tobacco is improved and a better quality of 'bidi' is produced.

Harra (Myrobalans). Its trade name is the chebulic myrabolan and is the fruit of *Terminalia chebula* (Harra). It grows wild in many districts of the State. But the

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(1) The Hitavada, Nagpur, January 31, 1957, p. 24.

(2) Report of the Forest Policy Committee, op. cit., p. 87.



reserved forests of Balaghat, Mandla, Bilaspur, Raipur, Raigarh and Kanker are the producers in large quantities. It is important as a tan-stuff and "is one of the finest and most prized of all the tanning materials." (1) The bulk of the fruit is exported outside India via Bombay or Calcutta in the form of whole fruit or after removing the stone. Jabalpur No. 1 and Jabalpur No. 2 are well-known in the countries of the west. (2) This is not because Jabalpur is the chief producer of Harra, but because it is the main centre of collection. The Provincial Industries Committee says that "the life time of each tree is limited, and as no natural or artificial regeneration takes place in these cultivated or heavily grazed areas, it is only a matter of time for all these valuable trees to die off, and the country loses an important natural produce." (3) The State should take up the question of replacing the trees in the areas where they grow naturally. There are potentialities in establishing factories for making tannin extracts near the source of supply. In this connection the Forest Policy Committee reports that "the possibility of establishing a

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(1) Report of the Provincial Industries Committee, op. cit., p. 52.

(2) Ibid., p. 52. Forest Policy Committee, op. cit., p. 52.

(3) Ibid., p. 52. Provincial Industries Committee, op. cit., p. 52.

factory in Kanker for making tannian extract is under examination."(1)

Mahua (Madhuca latifolia). Mahua is a flower-and-fruit-bearing tree. The flower is an important article in the diet of the people, especially of poorer classes and aborigines. Alcohol and alcoholic drinks are also made from its flowers and are of considerable economic importance. Oil of great industrial value is extracted from its fruits. The oil is used for edible and lubrication purposes. Mahua oil can also be used to harden soap.(2) It is worth noting that "when the forests were felled for the extension of cultivation, the mahua trees were spared ..." (3) The present position is that no one plants the mahua trees and unless and until some steps are taken "the existing trees in the Villages must inevitably die of old age ..." The Forest Department is taking steps for the regeneration of mahua trees.

Katha. This is extracted from the heartwood of Khair (Acacia Catechu). Khair is a common tree of dry forests, especially of Korea, Jabalpur, Sagar and Hoshangabad. Katha is made in the forests by a crude method - by boiling the heartwood with water. From this tree, three things of

- 
- (1) Report of the Forest Policy Committee, op. cit., p. 87.  
 (2) Report of the Provincial Industries Committee, <sup>Op.</sup>Cit., p. 47  
 (3) Ibid., p. 52.

commercial importance are obtained - cutch, Katha and Kheersal. Kheersal is a white powder and is an article of commerce.(1) Cutch is used as a dyeing and preserving agent, while Katha is used for eating with pan (betel leaves). The difference between Katha and Cutch is that the most of the tannic acid is removed from Katha. Trotter says that

"the rough 'country' methods of manufacturing both Cutch and Katha ... are wasteful, because when making cutch it is not possible to recover the catechin or Katha, while in the manufacture of Katha, the catechu-tannic acid (Cutch) is allowed to go to waste in the sand in which the Katha is collected."(2)

The Forest Research Institute has shown that considerable economy and improvement in yield can be effected by a few simple modifications of the crude method of preparing cutch. Further by that process cutch and Katha both can be obtained at one and the same time.(3) The Forest Policy Committee suggests examining the possibility of better quality Katha in a factory on modern lines. Further attempts should also be made to raise the plantation of Khair.(4). From the

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- (1) Trotter, H. - Manual of Indian Forest Utilization, Calcutta 1940, p. 255.
  - (2) Ibid., p. 256.
  - (3) Ibid., pp 256 and 257.
  - (4) Report of the Forest Policy Committee, op. cit., p. 87.

economic point of view the above two proposals are worthy of favourable consideration. It may be noted here that there is an up-to-date factory at Barielly (U.P.) which makes Cutch and Katha.

Rusa grass. Rusa or Tikhari grass (Andropogon Schoenanthus) of the 'motia' variety occurs in the forests of Amravati and part of Nimar, Betul and west Berar. On distillation it yields palmarosa oil with over 90% of geraniol, which is an important commercial product. At present it is distilled by a crude method, involving a high consumption of coal. The cost of collection of grass is also unduly high.(1) The Forest Policy Committee suggests that the "plantations of rusa grass can be easily made and if sufficiently large plantations are created, steam distillation in improved stills, should prove more economical."(2) Recently the Forest Department has taken up some plantation of this grass and made departmental distillation producing substantial profits.

Lac. This is the resinous incrustation of an insect found on certain trees. The most important trees are

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- (1) The Report of the Forest Policy Committee, op. cit., p. 88.  
 (2) Ibid., p. 88.

Ghout (*Zizyphus Xylopyra*), Palas (*Butea frondosa*) and Kusum (*Schli chera oleosa*). They are abundant in Damoh, Goudia and Dhamtari, Pendra and Katni. Small quantities occur in almost all districts of the State except in the extreme west. By crude bag-method, the major quantity of lac is converted into shellac within the State. The centres are Gondia, Dhamtari and Raigarh. Most of the Shellac of the State is exported to America. Out of the world output of Shellac, the major portion is utilized in the gramophone industry and the rest for the manufacture of varnish, water-proof inks, sealing wax, electric insulators, bangles, etc. Only up to a few years back India was the supplier of 90% of the world's output. Now, Thailand has become a serious rival. The gramophone industry now prefers synthetic shellac, as the quality of Indian shellac is not reliable. In 1945 the Provincial Industries Committee observed that "the chief deficiency is that shellac is manufactured principally by cottage and very small scale industry; it is usually subject to adulteration and there is no standardisation ... but there seems no doubt that unless the shellac trade is re-organised and its products standardised the time is bound to come when an efficient product will be synthesised, at a competitive cost." (1) It is a dollar earner and due

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(1) Report of the Provincial Industries Committee, op.cit., p.60.

attention should be paid by the Government to improve the situation.

The secondary industries based on forest products will be dealt with under the chapter on industries.

Silviculture. Next to agriculture, forestry and forest exploitation is the most important industry in Madhya Pradesh. Though it is found in every district of the State in a lesser or greater degree, forestry and the collection of forest produce are especially important in Hoshangabad, Nimar, Melaghat (Amravati district), Yeotmal, Betul, Sagar and Jabalpur. In spite of the fact that Madhya Pradesh has still some of the good forests of India, Silviculture practices are primitive. Sagreiya, Silviculturist to the Madhya Pradesh Government says that "Forestry, by which is meant the rearing of tree crops on scientific lines, is however still in its infancy, and has been practised only by Government for the past 60 years or so ... " (1) Consequent on the abolition of the Madhya Pradesh Proprietary Rights, private forests which constituted the larger proportion of the forests of the State, have been taken over for the management by the Forest Department. Henceforth, it is hoped that modern

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(1) Census of India, 1951, Vol. VII Part I-A Report, p.192  
(Quoted from the Report of the Industrial Survey Committee, Vol. II, Part II), p.192.



silviculture methods will be adopted in all the forests of the State. Different silviculture systems have been adopted for different types of forest to achieve the maximum benefits.

1. Good Quality Teak Forests. The teak forests which are pre-eminently suited for the production of large sized teaks are worked under the system of 'conversion'. At present there is an irregular crop, with a mixture of a smaller percentage of teak of all sizes and a number of less valuable species. (1) In due course of time these forests will be of high volume and value yield per acre. The Forest Policy Committee says that "a really satisfactory method of regulating the yield from such irregular forests, with but few utilisable species, has yet to be evolved." (2)

2. Good Quality Sal Forests. They are "converted into a series of age gradations, wherever natural regeneration can be relied upon." (3) The Forest Policy Committee says that "as no economically feasible technique for raising plantations of Sal has yet been applied in the State and as clear fellings do not give satisfactory

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(1) Report of the Forest Policy Committee, op.cit., p.24.

(2) Ibid, p.24.

(3) Ibid, p.24.

restocking owing to damage by frost or invasion of grass, they are being worked under the system of Selection-cum-Improvement fellings." (1) Those trees which are either marketable or interfere with the growth of other trees of greater value, especially those well-advanced, are felled. (2)

3. Other Forests. In the poorer quality teak, mixed and sal forests which produce mainly small timbers and fuel, the selviculture practised is Coppice-with Reserves. (3)

4. Bamboos. Standard prescriptions are being used in the exploitation of bamboos. The Forest Policy Committee says that "an all India investigation is in hand to find out if these need any modification." (4) It is not possible to make any suggestion in the case of the selviculture practised for bamboos as "the quantitative yield of bamboos from various forests has yet to be determined though an attempt was made to do so in Bori reserve." (5)

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- (1) Report of the Forest Policy Committee, op.cit., p.24.
  - (2) Ibid, p.24.
  - (3) Ibid, p.24.
  - (4) Ibid, p.24.
  - (5) Ibid, p.24.

(2) Report of the Forest Policy Committee, op.cit., pp 31 and 32.

The Selvicultural branch of the Forest Department of Madhya Pradesh has been able to do limited research work due to inadequate staff. (1) Another factor which contributes to this state of affairs has been given by the Report of the Forest Policy Committee. The Report says that "while the State Government are definitely committed under the 1894 policy not to give revenue production preference over the satisfaction of the local demand, the forest officers have often complained that their efficiency has been judged by revenue production. Be that as it may, one fact is quite clear. In the absence of any definite directive individual forest officers, through over-impetuosity or zeal, have often been swayed by considerations of revenue and have, albeit unwillingly, agreed to curtail even productive expenditure to swell the surplus ..... Neglect of cultural works may reduce expenditure and similarly over-felling may increase revenue for a time. Similarly, expenses on creating plantations and on research may diminish the surplus." (2) The main problems of selviculture in Madhya Pradesh as given by Datta are -

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(1) Datta, op.cit., p.819.

(2) Report of the Forest Policy Committee, op.cit., pp 51 and 52.

1. Natural reproduction of teak in high quality forests.
- 2.. Denovo reproduction in sal forests.
3. Best felling cycle and treatment of bamboo forests for maximum production.
4. Rehabilitation of large areas of degraded forests.
5. Technique of raising some economic species.
6. Determination of limiting incidences of grazing in different classes of forests, and
7. Improvement of pasture in the forests classed as "Pasture lands" and grass reserves. (1)

Working Plans. As the name indicates there are plans giving the time table and details of forest operation for the management of a forest. They affect the geography of forests. The plans are revised from time to time to meet the changed conditions of the forests. By 1900, simple working plans were made for almost all important Government forests of the State. By 1925, "a plan for the sal forests of Raipur was prepared, in which for the first time the fellings aimed at obtaining even-aged crops under the classical uniform system, and thus a beginning made to place management on a scientific footing." (2) An important step was taken in 1925, when the Working Plan Branch was created under

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(1) Datta, op.cit., p.819.

(2) Report of the Forest Policy Committee, op.cit., p.43.

its own staff. This Branch was closed as a measure of economy during the worldwide economic depression of 'Thirties. (1) As a measure of further economy the recruitment to Provincial and Indian Forest Services was stopped in 1929. The last blow came when the last war broke out. During the war period "departmental operations, conversion, transport and even despatch work had to be extended to expeditiously meet the war demand, almost regardless of cost and what was more detrimental, selvicultural principles. As the staff was limited, cultural works were curtailed or indefinitely postponed. Revision of working plans was also discontinued. Forests were felled far beyond the prescribed cut under the working plan. In short, years of work of conservation of forests was set at nought, and the value increment of forests, as a whole, diminished owing to inadequate tending." (2) After the cessation of hostility in 1945 the Forest Department busied itself with the revision of old working plans and the preparation of new plans. At present seven plans covering an area of 5,760 sq. miles are under preparation while sixteen plans

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(1) Report of the Forest Policy Committee, op.cit., p.43.  
(2) Ibid, p.44.

covering an area of 14,005 sq. miles have been revised. (1) The area under working plans at the end of the year 1952-53 was 21,039 sq. miles. (2) According to the Report on the Forest Administration in Madhya Pradesh, 44.9% of total forest area is under sanctioned working plans. (3) The areas which are not under the plans are mainly those of Indian States which merged with Madhya Pradesh in 1948 and private forests incorporated in Government forests on the abolition of Proprietary Rights in 1951.

The progress for concentrated regeneration and afforestation made during the year 1952-53, can be judged from the table given below.

Table No. 9 Showing progress for concentrated regeneration and afforestation during the year 1952-53. (4) ~~Figures~~  
~~in acres.~~

<u>Circle</u>	<u>Natural Regeneration</u>	<u>Artificial Regeneration</u>
	<u>Acres</u>	<u>Acres</u>
Eastern circle	26,825	315
Central circle	53,103	253
Western circle	57,170	950
Chhattisgarh circle	33,665	328
Total	170,763	1,846

Production and marketing arrangements. The table given below gives the annual out-turn of different kinds of

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- (1) Datta, op.cit., p.820
  - (2) Ibid., p.820.
  - (3) Report on the Forest Administration, op.cit., p.45.
  - (4) Ibid., p.57.



forest produce. (1)

Table No. 10. Showing the output of forest produce in 1951-52.

<u>Kind of Produce</u>	<u>Quantity</u> (in cu.ft.)	<u>Value</u> (in Rs.)
1. Timber	13,982,000	23,949,000
2. Roundwood	14,013,000	Included under timber
3. Firewood	88,453,000	7,322,000
4. Bamboos and canes	"	2,020,000
5. Fodder and grazing	"	3,089,000
6. Grass other than fodder	"	382,000
7. Gums and resins	"	85,000
8. Lac	"	872,000
9. Tanstuffs and dyestuffs	"	746,000
10. Other sorts of Minor produce including animal products	"	5,063,000
	<u>Total</u>	43,528,000

The Forest Department disposes of the produce by various methods. It is sold by public auction for commercial and other uses. The supply to the Government Departments is based on negotiated rates. Bamboos are sold either by public auction or on rated passes. To meet the bona fide domestic requirements of the local population it is sold on rated passes through vendors. Agriculturalists get their requirements through contractors at fixed rates or through the Department on rated passes. To sum up, "most of the forest produce, therefore, reaches the markets through contractors or smaller dealers." (2)

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(1) Indian Forest Statistics, op.cit., Table No. 3.1 pp 70 and 71 and Table No. 3.2 pp 80 and 81.  
 (2) Datta, op.cit., p.821.

There are certain handicaps facing the full utilization of the forest resources. Most important is the lack of proper communication. There is an inadequacy of railways and roads. Recently some roads have been constructed. Still there are large areas without railway connection, especially in the southern and eastern parts of the State. Another reason for lack of a full utilization of forest products is the absence of sufficient industries based on forest produce. There is scope for various types of industries which will be dealt with under the chapter on Industries. Other important problems in connection with the full utilization of the forest resources are the economical collection at suitable centres, proper seasoning and preservation treatment, specification of articles, standardization of sizes and grades and better and greater utilization of unpopular timber.

Grazing and Forestry. According to the Census of 1951, 76% of the population of Madhya Pradesh depend on agriculture directly and indirectly. For a State so predominantly dependent upon agriculture, livestock plays an important role in its economy. Cattle are the main motive power and provide milk and farmyard manure. Hence, grazing has been and still is a problem of great magnitude which needs immediate attention. Overgrazing has been the main cause of forest

deterioration and soil erosion in Madhya Pradesh.(1)

Unlimited or uncontrolled grazing is not consistent with scientific forestry. This does not mean that grazing in forests should be stopped altogether as a "moderate amount of grazing does little direct harm, and may even do a great deal of indirect good in reducing the risk of fire and in suspending regression at a desirable stage".(2) The National Forest Policy Committee has suggested the advantages of rotational grazing and points out the demoralising effects due to cheap forest grazing. Stall feeding is not practised in the State as grazing in the reserved forests is cheaper. During 1952-53, the number of animals grazed in Government forests were 7,246,092, an increase of 492,104 animals over the previous year.(3) The animals were allowed to graze at full and concessional rates or free of charge. The Report says "that a very heavy concession is being granted and even otherwise the 'full' rates do not represent the market rates for the grazing made available."(4) The important question

- (1) Soil Conservation and Afforestation, National Planning Committee, Bombay 1948, p. 74.
- (2) National Forest Policy, Op. Cit. p. 35.
- (3) Report on the Forest Administration in M.P. for the year ending the 31st March 1953, Nagpur 1955, p. 15
- (4) Ibid., p. 16.

"is how to get rid of the awful incubus of millions of useless scraggy livestock whose presence is responsible for the lamentable condition of grazing lands."(1) To overcome the overgrazing problems, certain measures are to be taken such as:-

1. The grazing charges should be increased, until they are costlier than stall-feeding. This will also help in the elimination of uneconomic livestock which are kept on philanthropical considerations.
2. There should be rotational grazing. This has already been introduced in certain areas of the State.
3. In regeneration areas grazing must not be permitted to avoid the seedlings being browsed or trampled upon.
4. There should be a study to find out the best methods of improving the grazing grounds and for cultural treatment.
5. The public should be educated about the advantages of stall-feeding.

Five Year Plans. In India, forest development and conservation also involve the problem of the advancement of the tribal population inhabiting the forest. It is the tribesmen who are generally employed for the collection of forest produce. The tribes frequently practise shifting cultivation which leads to extensive soil erosion and presents a problem for the administration.

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(1) Soil Conservation and Afforestation, op. cit., p. 78.

(1) The First Five Year Plan, Planning Commission, Delhi 1953, p. 294.

The Planning Commission's programme envisaged in the First Five Year Plan (1951-56) were:-

1. Strengthening the forest administration where large territories have been merged or private forests have been transferred to public ownership as a result of abolishing zamindari and jagirdari (abolition of Proprietary Rights),
2. Renovation of areas which were over-exploited to meet war requirements,
3. Afforestation where large scale soil erosion has occurred,
4. Development of forest communications,
5. Stepping up supplies of timber by increased use of non-conventional species after proper seasoning and treatment by chemical methods and, therefore, increasing the number of seasoning kilns and treatment units. (1)

It is to be noted that certain basic problems, such as the encouragement of sedentary cultivation among aborigines and tribesmen, forest village welfare, teaching of handicrafts to forest labour to provide secondary means of livelihood, labour education, health and welfare, rural uplift, etc., have been ignored in the First Plan. Another factor, not less important, is the coordination of development schemes all over the country, which has also no mention in the Plan. As far as possible within the limited resources available to the Forest Department, it does seek to ameliorate the conditions

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(1) The First Five Year Plan, Planning Commission, Delhi 1953, p. 294.

(2) The Second Five Year Plan, Planning Commission, Delhi 1956, p. 201.

(3) Tiwari, op. cit., p. 131.

(4) Ibid., p. 131.



of labour. But much remains to be done. It may also be mentioned here that the above things have been given due place in the Second Five Year Plan.(1956-61).

How far the target achieved in the first Plan is difficult to say as "the physical targets achieved particularly in respect of nett bare areas afforested is not available."(1) But according to the National Planning Commission "during the first plan period, State Governments carried out a number of schemes relating to afforestation, development of forest communications, strengthening of forest administration and formation of village and small-scale plantations.(2)

It is worth noting that "during the currency of the First Five-Year Plan there has been no increase in the area under forest."(3) Not only was there no increase in the area under forest but

"the nett forest area has decreased during the currency of the First Five-Year Plan. No exact statistics are available but in the past quinquennium there has been widespread deforestation in the erstwhile private forests ... Large areas of forests were deforested under one pretext or the other by the owner before they could vest in the Government."(4)

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- (1) Tiwari, K.M. - Forestry in the Second Five-Year Plan, The Indian Forester, Vol. 82, No. 3., March 1956, Dehra Dun, n.d., p. 130.
  - (2) The Second Five Year Plan, Planning Commission, Delhi 1956, p. 301.
  - (3) Tiwari, op.cit., p. 131.
  - (4) Ibid., p. 131.



Only an intensive survey and collection of data can reveal how much of the forest area has been cleared since 1950-51.

In the Second Five Year Plan, it has been decided to continue the work started during the first plan and include the measures given below,

1. Afforestation and improvement of poorer areas in the forests and extension of forestry,
2. Formation of plantations of species of commercial and industrial value,
3. Promotion of methods for increased production and availability of timber and other forest produce in the immediate future,
4. Conservation of wild life,
5. Amelioration of the conditions of staff and labour in the forest,
6. Increased tempo of forest research,
7. Increased provision of technical personal, and
8. Central Co-ordination and guidance in the implementation of forest development schemes all over the country.(1)

In the first plan the main objective was the rehabilitation of degraded forests and "setting up an adequate administrative machinery."(2) In the second plan "the Central Government will pay special attention to research, education, demonstration and co-ordination, and the States will carry out the forest development projects."(3)

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- (1) Second Five Year Plan, op. cit., p. 302.
  - (2) First Five Year Plan, op. cit., p. 286.
  - (3) Second Five Year Plan, op. cit., p. 302.

(1) Second Five Year Plan, op. cit., p. 302.  
 (2) Ibid., p. 304.

Conclusion. The picture that emerges from the above survey is that Madhya Pradesh has the highest area under forest in the Indian Republic, with Sal forest in the east, teak in the west and mixed forest in between them. There are several species which can be utilised as raw material in various types of industries. Though the area is large, the forests are in a depleted and degenerated condition for one or the other reason. The useful economic trees are not sufficient to meet the growing demands of industries. With industrialization in India there will be a progressive demand for forest produce. As such the forest policy should be such as to secure long-range development of forest resources on one-hand and on the other to meet the increased demand in the immediate future.

A large area of degraded forests has been acquired by the State. This "should be surveyed and demarcated on the ground or indicated on maps." (1) These forest lands need urgent rehabilitation. In the near future there is no likelihood of their becoming productive. For future planning there is "lack of basic statistical information." (2)

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(1) Second Five Year Plan, op. cit., p. 302.

(2) Ibid., p. 304.

There should be surveys of resources, especially of timber, its utilisation and end-uses, and future trends in consumption.

It is to be noted that the Forest Department is within the State Governments sphere. The State Government is responsible for development work, preparation of working plans, management and exploitation of forests. There are certain forests which are as important for the neighbouring States, and in certain cases even more important to the neighbouring States than to the State they are located in. But unfortunately, the neighbouring States have no say in the matter of their management. They can be exploited to the detriment of the neighbours. In 1944, Sir Herbert Howard, then Inspector-General of Forests for India, rightly wrote to the Madhya Pradesh Government that

"it is, however, to a certain extent the guardian of many other States because several very large rivers have their headwaters in Madhya Pradesh. I do not imagine it will ever arise, but I do not quite know what the position would be supposing for instance, Madhya Pradesh deforested all these headwaters. It would actually do far more harm to other States than to its own."(1)

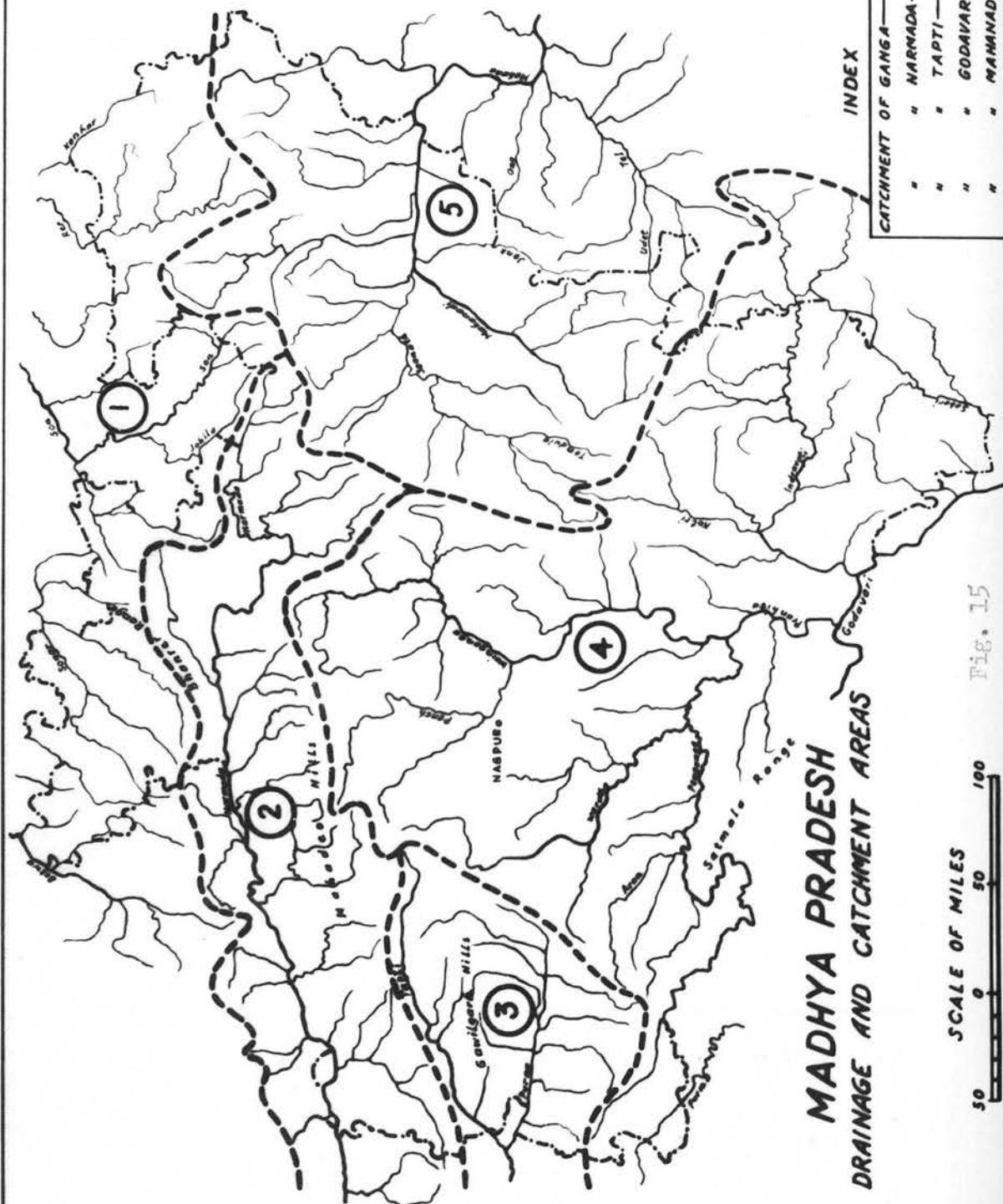
(1) Second Five Year Plan, op. cit., p. 205

(1) Report of the Forest Policy Committee, op. cit., p. 47.

The Planning Commission was alive to this point and for that purpose it "proposed to set up a Forestry Commission for co-ordination of forest development and management." (1) This is an advisory body and not statutory. The State Government may or may not accept its recommendations. Hence, the Centre has no power to compel the State to support them. In the national interest Protection and National forests should be under the control of the Centre, while village forests and Tree-lands under State Governments.

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(1) Second Five Year Plan, op. cit., p. 306.



# **MADHYA PRADESH DRAINAGE AND CATCHMENT AREAS**

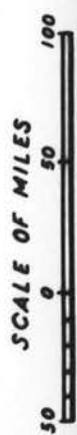


Fig. 15

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#### Chapter IV. Drainage, Irrigation and Power Resources.

##### Section A - Drainage

(Fig. 15)

As mentioned in connection with the geology of the State, Madhya Pradesh is underlain mainly by archaen rocks. As the Peninsula is of great antiquity, the rivers are also very old. These rivers have reached base level due to a long period of degradation. Generally the valleys are broad and shallow. The rivers have low gradient and there is but little momentum. In normal time they act as agents of deposition and it is only during flood period they behave as agent of denudation.

Generally the rivers of the Peninsula flow towards the east and drain into the Bay of Bengal. There are two exceptions to this general rule - Narmada (Narbada) and Tapi (Tapti). Both have a westerly trend and empty into the Arabian Sea. No rivers in the whole of the subcontinent discharge their drainage to the west, except the two rivers mentioned above. The explanation for the behaviour of the Narmada and Tapi given by Wadia is that "the Narbada and Tapti do not flow in valleys of their own eroding, but have



usurped for their channels two fault-planes, or deep alluvium-filled rifts in the rocks, running parallel with the Vindhya." (1) Another view equally probable is the supposition that "the present Peninsula is the remaining half of a land mass, which had the Ghats very near its centre as its primeval water-shed. This water-shed has persisted, while a great extension of the country west of it has been submerged underneath the Arabian Sea." (2)

The Vindhya and the Satpura ranges form water-shed areas. From these are given off the Ganga (Ganges) affluents - the Chambal, the Sind, the Betwa, the Ken and the Son to the north. The Damodar and Subarnarekha flow to the east, the Wainganga and the Wardha to the south, and the Narmada and Tapi to the west.

The whole of the State lies in the catchment basins of the Ganga, the Narmada, the Tapi, the Godavari and the Mahanadi (Fig. 15). It is proposed to deal with the above-mentioned basins and show their economic importance as well.

(i) Ganga Catchment. The Ganga Catchment covers most of Sagar, Jabalpur, Mandla, Korea and Surguja districts. These areas lie on the Vindhyan plateau and slope northwards. They drain into the Ganga. Their general elevation is from

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(1) Wadia, D.N. Geology of India, 2nd Edn., London, 1939, p.17.  
 (2) Ibid, p.17.

1,500 feet to 2,000 feet with occasional hills rising to over 3,000 feet. There are several rivers which flow from the Vindhya and Satpuras. Out of these the Chambal and the Betwa join the Yamuna at Etawah (U.P.) and Hamirpur (U.P.) respectively. The Son rises from the Amarkantak plateau and joins the Ganga near Patna (Behar). The course of the Son within the State is 487 miles. During the dry season it is shallow though still rapid. It varies in breadth from 60 to 100 yards. The discharge of water during the greater part of the year is small and is estimated as low as 620 cubic feet per second, while during the rainy season it increases rapidly and reaches to 830,000 cubic feet per second.(1) The consequence is heavy flooding, but fortunately this is of short duration, seldom lasting for more than four days.

The Son is in sharp contrast to the Narmada. It is followed neither by a road nor a railway. There is a little alluvium along the river. There is evidence that the river has been slightly rejuvenated. (2) This river is mainly used for floating down large rafts of bamboos and a little timber. In the U.P. portion of the Son, it is used for irrigation. (3) The Son Valley is an empty

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- (1) Imperial Gazetteer, C.P., Oxford, 1908, p.145.  
 (2) Spate, O. H. K. - India & Pakistan, London, 1954, p.582.  
 (3) Stamp, L. Dudley - Asia, Lond. 1952, p.299.

land with great sal forests and "isolated patches of subsistence cultivation." (1) This drainage system contributed much of sediments to the northerly sea during the Mesozoic and the early Tertiary period. (2)

(ii) The Narmada Catchment. The source of the Narmada is Amarkantak, which is the most prominent of the Maikal Hills. Its course is complex as far as the Marble Rock gorge, below Jabalpur. Spate says that the "steepness and straightness of the lower Narmada (Narmada) gorges suggest a recent origin, and it seems likely that the Narmada originally flowed out on the Tapti (Tapi) line via the Burhanpur Gap". (3) The sanctity of the Narmada is rivalled by the Ganga only. Historically the river is considered to be the boundary between the Madhyadesh (Middle land) and the Dakshinapatha (southern land).

The catchment includes parts of Bilaspur, Mandla, Jabalpur, Balaghat, Hoshangabad, Seoni, Chhindwara and Nimar. The principal tributaries of the Narmada are the Banjar in Mandla, the Sher and Shakkar in Narsinghpur, and the Tawa, Ganjal, and Chota Tawa in Hoshangabad districts. The only important tributary to the north is the Hiran in

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(1) Spate, op. cit., p.582.

(2) Krishna, M. S. - Geology of India and Burma, Madras, 1949, p.21.

(3) Spate - op. cit., p.581.

in the Jabalpur district. Most of these rivers are responsible for rapid floods in the Narmada. Owing to the rapid falls caused by its tributaries and to its rocky course, the Narmada is not navigable, except during August and February and only then by country boats.

The valley floor of the Narmada is some 20 to 40 miles wide, while the river occupies only 20 to 40 feet within it. The valley floor is traversed by a number of rapid streams from the Satpuras, which have made gullies and there is no scope for dams on either side of the hill streams.

The alluvial soil has been eroded away by these deep channels. Where the soil is preserved, it is extremely fertile and wheat is cultivated. There have been no attempts made at soil conservation yet. The upper reaches of the catchment basin are mostly rugged hills with forests of a fairly good quality including the famous teak forests of Bori. The best teak of India, known as C.P. teak, comes from this area.

(iii) The Tapi (Tapti) Catchment. Tapi is one of the great rivers of Western India. Its source is believed to be the sacred tank of Multai in the Betul district, but the real source is two miles distant. It flows almost parallel to the Narmada and drains the southern slopes of the Satpuras and the northern slopes of the Melghat plateau.

It covers Betul, Amravati and part of Nimar. Its most important tributary is the Purnea, which after emerging from the Gawilgarh hills of the Melghat plateau flows to the south and then to the west joining the Tapi just outside the State. The Tapi first traverses an open and partially cultivated plain and then plunges into a rocky gorge of the Satpura Hills. The bed is rocky and bordered by forests. The valley is comparatively narrow until Burhanpur is reached, where it opens out into a wider tract. The second and the third sections of the river lie in the Bombay State. In the lower reach flooding is very common. At times it causes great damage to the districts of Surat (Bombay State) and Navsari (Baroda State).

The Tapi flows so near the foot of the Satpuras, that its tributaries on the right bank are small. Its other tributaries are the Girna, the Bori, the Panjhra and the Borai. The Girna and the Panjhra have been dammed up in several places for irrigation purposes. The Tapi drains an area of about 10,900 square miles in Madhya Pradesh. (1) It assumes the form of a fairly big river after its confluence with the Purna at the corner of the East Khandesh (Bombay State), otherwise within the State it is a very

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(1) Hydrological Study of Tapi Valley, Part I, Govt. of India Central Water and Power Commission, New Delhi. 1951. p.4.

small river. Out of 14,400 square miles of its plain area, nearly 5,400 square miles lie in Madhya Pradesh. Out of this 5,400 square miles of plain area in Madhya Pradesh about 4,600 square miles is in the Purna Catchment. (1)

In its upper valley there are several basins of exceedingly rich soil. These basins have been covered by forests. The bulk of the catchment of the Tapi lying within the State is extremely rugged and carries an extensive forest except the western edge of the valley in which lies the plains of Burhanpur, which are covered with deep black cotton soil. The Purna drains the most fertile tract of Berar. There are no pastures or forests in this tract.

Recently the Central Water and Power Commission, Government of India, has made hydrological studies of the Tapi Valley. The survey is not complete. Three sites, namely Nawtha, Hathnur and Vajpur, have been selected for dams. They are multi-purpose projects. The first is in Madhya Pradesh and the other two in the Bombay State. (2)

(iv) The Godawari Catchment. The portion of the Godavari within the State is small; it is to be found near Sironcha. Here it forms the southern boundary. The principal tributaries within the State are the Penganga, the

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(1) Hydrological Study of Tapi Valley. Op. cit., p.4.

(2) Ibid., pp. 4 and 5.



Wardha, the Wainganga and the Indravati. During flood time, the Godavari brings down an enormous volume of water. Embankments on both sides of the banks are necessary to prevent it from inundating the surrounding country.

The Penganga, which makes the boundary between Madhya Pradesh and Hyderabad State, drains the hilly tract south of Buldana. Eventually it joins the Wardha. The Wardha emerges from the Multai. It drains the more or less plain country lying between Nagpur, Amravati and Chanda. This plain is intensively cultivated with cotton and juar (a kind of Indian millet, *sorghum vulgare*). After crossing Chanda it drains rich forests and ultimately forms the southern boundary of the State. The source of the Wainganga is near Seoni on the Satpura plateau. The most important tributaries of the Wainganga are the Kanhan and the Pench. The sources of these tributaries are the southern slopes of the Mahadeo hills. They drain the forests of Chhindwara, Nagpur and Wardha. The Pench joins the Kanhan a few miles north of Kamptee and then Kanhan drains into the Wainganga south of Bhandara. The Wainganga drains the forests of Seoni, the lower Balaghat plateau and Bhandara. Thereafter, it enters the extensive forests of Chanda and meets the Wardha at Chapralla, beyond which the combined flow is known as the Pranhita which finally discharges itself into the

Godavari near Sinoncha. An important feature of this tract is the presence of numerous tanks used for irrigating rice. The original source of the Indravati is not within the State but in the Eastern Ghats. It enters the State east of Jagdalpur. For some 30 miles the Indravati traverses a more or less flat country. The forests of this area have been destroyed by either shifting cultivation or excessive fellings by the agriculturists. Afterwards the river descends about 100 feet at the Chitrakot falls. At Bamragarh it is joined by the Kotri from the north. Finally the Indravati discharges into the Godavari south of Sironcha. The lower portion of the Indravati catchment is without permanent cultivation, but shifting cultivation is frequent. There must have been large stretches of good quality forest but they have been destroyed and now much is scrub. (1) The Godavari canals which were opened in 1911-12 lie in Bombay State. (2)

(v) The Mahanadi Catchment. The Mahanadi (literally 'the great river') rises in an insignificant pool near Sihawa in the extreme southeast of the Raipur district and runs "in a clockwise direction through Kaimur and Maikal

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- (1) Report of the Forest Policy Committee, M.P., op. cit., p.11.  
 (2) Development of Irrigation in the Deccan Canal Areas, Technical Paper No. 49, Bombay 1934, p.6.

ranges and the southern slopes of the extensive Manipat and Pandrapat plateau." (1) Emerging from the pool, it runs to the north and drains the eastern portion of the Raipur district. On entering the Bilaspur district, it turns in an easterly direction. Later it leaves the State at the border of Raigarh to enter Orissa State. The principal tributaries of the Mahanadi within the State are the Seonath, the Jonk and the Hasdo. The Seonath joins the Mahanadi a little above Seorinarayan when it enters the Bilaspur district. The Jonk and the Hasdo join the river in the Bilaspur district. The river drains mainly the districts of Durg, Raipur, Bilaspur and former Indian States of Kankar and Kawardha. The total course of the Mahanadi is about 550 miles, of which about half is in M.P. (2) The total drainage area of the river is about 51,000 square miles, of which about 27,000 square miles is within the State. (3) The catchment comprises hills and plains. The underlying rocks on the hills are granites and gneisses of the Dharwar formation, those in the plains are laterite. Within the State "the bed of the Mahanadi is open and sandy, with banks usually low, bare and unattractive". (4) The soil is 'bhata' or laterite. The annual rainfall of the

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(1) Report of the Forest Policy Committee, op. cit., p.11.

(2) C.P. Gazetteer, 1908, op. cit., p.155.

(3) Ibid, p.155.

(4) Ibid, p.157.

catchment is between 40 and 65 inches (Durg 45 inches, Bilaspur 50 inches, Raipur 55 to 60 inches and Kankar 60 inches). Prarnik and Rao calculated "that about 57 per cent of the rainfall of the catchment occurs during the months July and August, 72 per cent during July to September, and about 88 per cent of the annual rainfall during the months June to September. If October is also included, 92 per cent of the rainfall occurs during the months June to October." (1) During flood time the river has a rapid current and the maximum discharge at the mouth is calculated to be nearly 2 million cubic feet per second. It is as great as that of the Ganga. On the other hand, during the dry season it is only 1,125 cubic feet per second. Against this the Ganga discharges at that time is 45,000 cubic feet per second. From October to June the river is nothing more than a narrow and shallow channel. The water of the Mahanadi is not utilized for irrigational purposes within the State, except where, "about 11 miles downstream, there is a small weir at Rudri from which a canal takes off on the left." (3) Only rice is grown on this irrigated land. (4) No floods are experienced in

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- (1) Prarnik, S.K., and Rao, K.N. - Rainfall in the Mahanadi Catchment above Hirakund, The Central Board of Irrigation Journal, Vol. 7, No. 6, November 1950, Simla 1951, p. 606.
- (2) C.P. Gazetteer, 1908, op. cit, p.155.
- (3) Hydrological Data of River Basins of India: The Mahanadi Basin, Delhi 1956, p.2.
- (4) Ibid, p.2.

the Mahanadi catchment within the State, though it plays havoc in Orissa State. Mahalanobis has divided the whole catchment into five sections (two in this State and three in Orissa) and in his opinion each section can be isolated at times of floods. (1) From its source up to Arang (Raipur district), about 120 miles, the river is navigable, but "through traffic has now, ... , been <sup>superseded</sup> ~~suspended~~ by the railway ..." (2)

The high rainfall and large irrigation tanks are two characteristics of the entire catchment. On the hilly tract of the Mahanadi, there are extensive sal forests in Bilaspur and Kawardha in the north and near Sihawa in the south and miscellaneous species around Dhamtari. In North Raipur Division is found some good teak. There are practically no forests on the plains of the Mahanadi catchment. Rice is cultivated on almost all productive land. As the soil is 'bhata' or lateritic it is unsuited for the growth of fodder crops. Hence, there is an acute shortage of fuel and fodder in the plains.

- 
- (1) Mahalanobis, P. C. - Rain Storms and River Flood in Orissa: Sankhya: The Indian Journal of Statistics, Vol. 5, Part I, September 1940, Calcutta n.d. p.5.  
 (2) C.P. Gazetteer, 1908, op. cit., p.157.

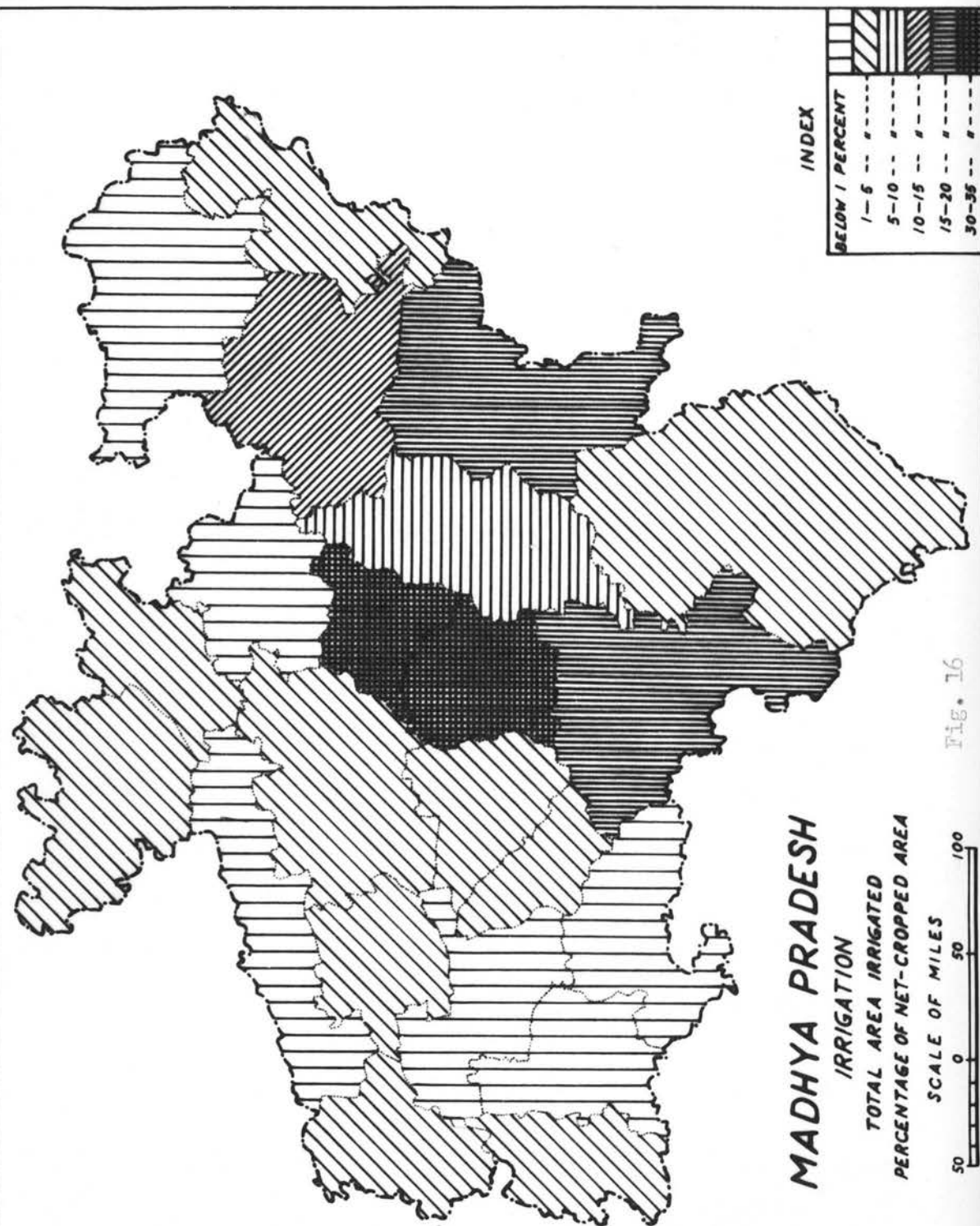


Fig. 16



## Section B - Irrigation

(Figs. 16 - 20)

In spite of the fact that agriculture is the chief occupation of the overwhelming majority of the population of India, the cultivation of land and yield per acre are not as efficient as in many other countries. There are many reasons for this drawback. But the most important is the scarcity, uncertainty and irregularity of water supply. In other words, water supply is the main problem in the agricultural development of the country. The main source of water supply needed for agriculture is, of course, the annual rainfall. Rains come in India on more or less fixed dates and generally help in agricultural operations. But the rainfall often fails (on an average once in a decade), is generally irregular and not evenly distributed throughout the season. That means the water is not available precisely as and when it is required, though in the same season it may be in excess in some parts and in deficit in others. In some parts there may be flooding causing havoc to crops, property and lives and in others scarcity or even famine. Indian agriculture mainly depends on the vagaries of the Monsoon.

Irrigation and Navigation Commission, New Delhi, 1947, p.1.

(2) Waterways of India - Central Board of Irrigation, Leaflet No. 4, Simla 1947, p.7.

One of the solutions to the problem is the provision of irrigation facilities. India is fortunate in her immense water resources and in her widespread waterways. A number of irrigation projects, some of them the most magnificent in the world, have been constructed during the last one hundred years in both North India and the south. But still "less than 6% of the available water wealth of the rivers is being put to beneficial use and the balance of over 94% is running waste to the sea." (1) Hence, there is vast scope for the development of water resources in certain parts of India.

In certain areas there is a net of irrigation works while in others such works are conspicuous by their absence. There are several causes for this, but two outstanding factors have contributed to the slow progress of irrigation development. Before the introduction of the Montagu-Chelmsford Reforms (1919), it was essential to obtain the sanction of the Secretary of State for India to undertake any large irrigation work. (2) After 1921, when the Reform came into force, "Irrigation became a Provincial but Reserved Subject; Hydroelectric development,

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- (1) Water Resources of India: Their Conservation and Utilization, Govt. of India Central Water-Ways, Irrigation and Navigation Commission, New Delhi, 1947, p.1.
- (2) Waterways of India - Central Board of Irrigation, Leaflet No. 4, Simla 1947, p.7.

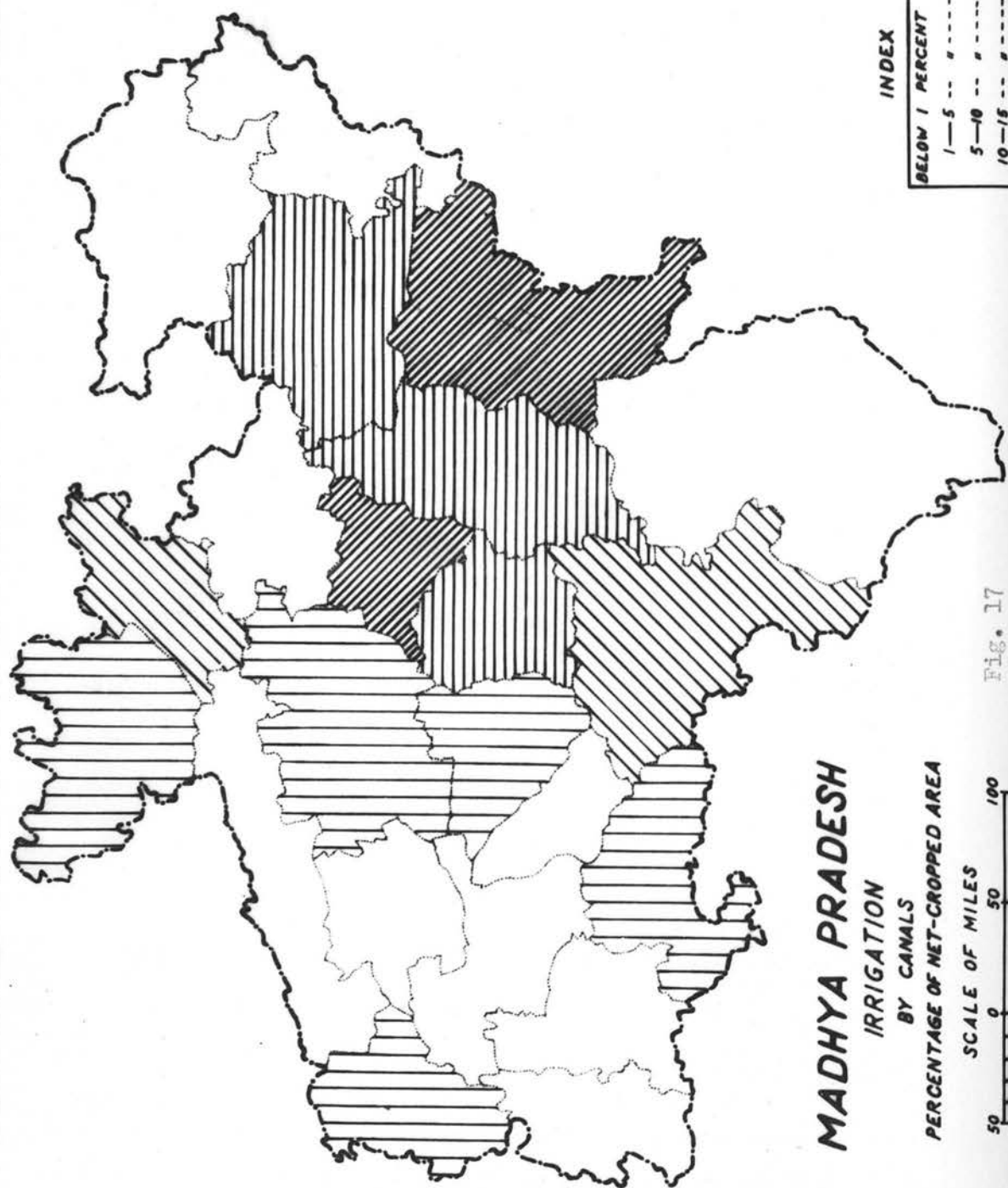
development, on the other hand, became a Provincial but Transferred Subject." (1) When Provincial Autonomy was introduced in 1937 irrigation "became a purely Provincial Subject". (2) Every province had power to develop its water resources for irrigational purposes. The result of this was that the Provinces had not sufficient resources to develop their irrigational work and no appreciable work was done in the areas in which the central government was not interested. The second drawback was the independence of irrigation and hydroelectric power projects from each other. There were no multi-purpose projects. Each project was examined either purely as irrigational or purely power. The result was that most of the projects were declared an uneconomic proposition. It was not until 1945 that the Central Waterways, Irrigation and Navigation Commission and the Central Technical Power Board were set up by the Central Government. The function of the Board is "to collect and collate data for the systematic employment of all the water power resources of the country". (3) If river valleys are to be developed and made an economic proposition, there should be multi-purpose river projects.

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(1) Waterways of India. Op. cit. p.8.

(2) Ibid, p.8.

(3) Brown, J. C. and Dey, A. K. - India's Mineral Wealth, 3rd Edn. Bombay 1955, p. 675.



INDEX

BELOW 1 PERCENT	1-5	5-10	10-15

Fig. 17

There are no multi-purpose projects envisaged in the first Five Year Plan for this State. Either they are Irrigation projects or Power projects. In the second Five Year Plan there is only one project, namely Tawa, for both irrigation and power. (1)

The important sources of irrigation in Madhya Pradesh are canals, tanks, and wells. Out of an area of 1,907,067 acres irrigated (Fig.16) in the year ending the 31st May 1952, irrigation by canals accounted for 827,949, by tanks for 743,563, by wells for 225,204 and by other sources for 110,351 acres. (2)

(1) Canals (Fig.17). River irrigation, though it commands much more area than well or tank irrigation, and is cheaper in the long run in spite of very high investment at the outlay, has its problems. Of these, increasing salinity is the most serious. The great Indus River Irrigation System has revealed the handicap of salinity in the water, as the river passes through the areas of the Punjab Salt Mines. There is also the danger of the river shifting its bed as it frequently does in Bengal.

Before the first World War there was no canal irrigation

- 
- (1) Times of India Directory, 1955-56, Op. Cit., p.695.  
 (2) Second Five Year Plan - Govt. of India Planning Commission, New Delhi 1956, p.363.

practised in Madhya Pradesh. (1) After the World War I, two major works were completed in 1925 - Wainganga Canal and Mahanadi Canal.

Wainganga Canal was started in August 1916 and completed in March 1925 and the area irrigated in 1944-45 was 59,372 acres. (2) In 1952-53, the area irrigated was 69,640 acres. (3) The canal is situated in the Balaghat district. The Mahanadi Canal in the Raipur district also came into operation in March 1925, and commanded an area of 197,443 acres in 1944-45 (4) but in 1952-53, it irrigated an area of 229,819 acres. (5)

The principal Irrigation Project for Madhya Pradesh incorporated in the Second Five Year Plan (1956-61) is to be the Tawa Project - the first multi-purpose project in the State to irrigate and to produce electric power. When this scheme is completed it will irrigate an area of 590,000 acres. (6)

Tandula Reservoir is an important one in the Durg district. It was completed in 1925.

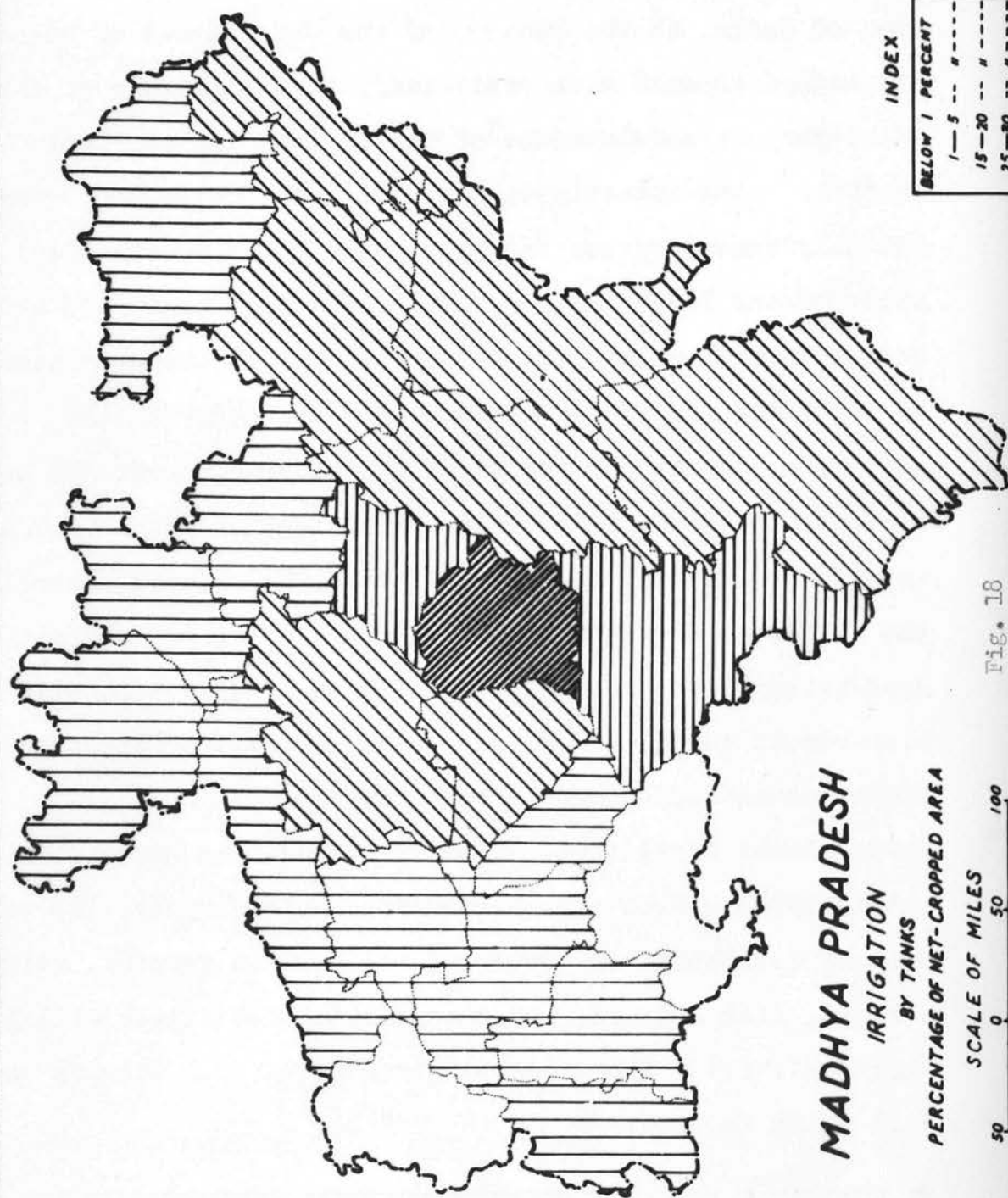
- 
- (1) Imperial Gazetteer of India - C.P. - Oxford 1908, p.44.
  - (2) National Planning Committee: River Training and Irrigation, Bombay 1947, p.125.
  - (3) The Times of India Directory and Yearbook 1955-56, Bombay, p.695.
  - (4) National Planning Committee, op. cit., p.125.
  - (5) The Times of India, op. cit., p.695.
  - (6) Second Five Year Plan, op. cit., p.363.



In 1951 the Central Water and Power Commission, Government of India, at the request of the Governments of Bombay and Madhya Pradesh made preliminary investigations of the multi-purpose developments of the Narmada and the Tapi (Tapti). The investigation is still in preliminary stages and only some progress has been made in the hydrological study of the Tapi Valley. The Report says that "the main object of this multi-purpose development is the provision of extensive irrigation in both the provinces and the adjoining States, generation of hydroelectric power to help the development of industries and navigation, agriculture, tapping the mineral resources of the valleys, and controlling the floods to save the vast plains which are at present devastated by the high floods in these rivers. It will also result in the extension and development of the ports of Broach and Surat and in the provision of inland navigational facilities. Besides these main objects, other subsidiary benefits such as domestic water supply, improvement of sanitation of towns and villages in general, malaria control, fish culture, and recreational facilities will be achieved". (1) The priority given to various schemes on Tapi is as follows:-

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(1) Hydrological Study of Tapi Valley, Part I (Rainfall Study), Govt. of India Central Water and Power Commission, New Delhi 1951, p.1.



INDEX

BELOW 1 PERCENT	1-5	15-20	25-30
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Fig. 18

- (a) Pick-up weir across the Tapi at Kakrapar,
- (b) Storage and flood detention dam on the Tapi near Vajpur,
- (c) Dam across the Tapi at Hatnur,
- (d) Dam across the Tapi at Nawtha. (1)

In its hilly area the Tapi Catchment is covered with thick forests and its plain area is broad and fertile. The plain area is mostly culturable. (2)

Recently the Government of India has begun to investigate certain projects in Madhya Pradesh. Among them are the projects mentioned below which are under investigation. (3)

- (a) Hasdeo river project.
- (b) Panch Kanhar Canal Project.
- (c) Upper Wainganga Project.
- (d) Bagh river project.

(2) Tanks (Fig. 18). Wells and tanks, being on the land immediately benefitting from them, are likely to be much more suitable to the peculiarities of the soil, crop and the cultivator's ability in each case. Tanks are a useful source of irrigation. They are found extensively in tracts where the rainfall is meagre. They vary

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- (1) Hydrological Study of Tapi Valley. Op. Cit., p.1.
  - (2) Ibid, p.6.
  - (3) Report of Ministry of Irrigation and Power, 1955-56, Indian Journal of Power and River Valley Development, Vol. VI, No. 5, May 1956, Calcutta n.d. p.18.

greatly in their sizes, and present peculiar problems. The larger works are few in number, need considerable technical assistance, and require a large expenditure of money to make them reasonably safe against breaches. But most of the tanks are small units which can be maintained by village communities concerned, who can pay the requisite attention when required. Commenting on tanks, the National Planning Committee writes that they "are expensive works both in construction and in their upkeep, and they are liable to fail when most wanted. As storages, however, they are very useful where the rainfall is ill-distributed." (1) Further in its opinion "the scope for extension here is limited." (2)

Tank irrigation is confined almost entirely to the Wainganga rice districts. There are 74,850 irrigation tanks in the whole of the State. The highest number of tanks is in the Chhattisgarh subdivision (37,754) followed by East Maratha Plain Subdivision (31,897). (3) There are three types of irrigation tanks, Government, Private Aided and Private Un-aided. The highest number of tanks is Private

- 
- (1) River Training and Irrigation, National Planning Committee, Bombay 1947, p.39.  
 (2) Ibid, p.39.  
 (3) Tables of Agricultural Statistics for the year ending the 31st May 1952, Nagpur 1955, Table III-A, p.3.

unaided followed by the Government and Private aided as is shown in the table given below.

the Deccan Trap. Table No. 11  
Showing number of irrigation tanks  
in Madhya Pradesh

1. Private un-aided	70,184
2. Government	2,908
3. Private - aided	1,758
	<hr/>
	74,850 (1)

The highest number of tanks in the Bilaspur district (12,956) and the lowest in the Amravati district (one only).

(2) Both (Bilaspur and Amravati) are in plains - Bilaspur occupies the northern portion of the Chhattisgarh Plain and Amravati the Berar Plain. Bilaspur is hemmed in on the north and west by the Maikala range of the Satpuras while Amravati by a small chain of barren and stony hills. The rainfall of Bilaspur is 50 inches per annum and of Amravati 29 inches. The elevation of Bilaspur is from 1,000 feet to 750 feet above the sea level and of Amravati 800 feet. Bilaspur is a forested area while Amravati has scanty vegetation during hot season. The plains of

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(1) Table of Agricultural Statistics, op. cit., p.3.  
 (2) Ibid, p.3.

Bilaspur are composed mainly of shales and limestones of the lower Vindhyan series. The Amravati plain belongs to the Deccan Trap. The soil of Bilaspur is black cotton soil and of Amravati, a deep, rich, black loam. The main reasons for this difference are the rainfall, hills bordering the districts, rocks and soil. The table given below shows the number of irrigation tanks in each district of Madhya Pradesh.

Table No. 12.

Showing the number of irrigation tanks  
in each district of Madhya Pradesh (1)

<u>Narmada Valley Subdivision</u>		<u>East Maratha Plain Subdivision</u>	
1. Sagar	618	14. Chanda	11,538
2. Jabalpur	1,429	15. Bhandara	12,832
3. Hoshangabad	142	16. Balaghat	7,524
4. Nimar	8		
Total:	2,260	Total:	31,894
<u>Plateau Subdivision</u>		<u>West Maratha Plain</u>	
5. Mandla	603	17. Wardha	40
6. Betul	63	18. Nagpur	892
7. Chhindwara	1,256	19. Amravati	1
		20. Akola	22
Total:	1,922	21. Buldana	19
		22. Yeotmal	46
<u>Chhattisgarh Plain Subdivision</u>		Total: 1,020	
8. Raipur	11,053		
9. Bilaspur	12,956		
10. Durg	6,199		
11. Bastar	2,248		
12. Raigarh	4,165		
13. Surguja	1,133		
Total:	37,754.	Grand Total=	74,850



In other words in the natural division of N.W. Madhya Pradesh, there are 4,182 tanks, in E.M.P. 64,448 and in S.W.M.P., 1,020. The highest number of tanks in E.M.P. where the rainfall is between 43 inches and 63 inches per annum. It comprises the plateau area of Surguja, Raigarh, Bilaspur and plains of Balaghat and Bhandara. The rocks of the plateau region are granite, gneisses and other metamorphic rocks while of the plain, slates, phyllites, schists, quartzite, gneisses and granites of Archaean age. The soil is generally red sandy or black sandy. Next is N.W.M.P. Here the rainfall varies between 31 inches and 58 inches. It is mostly hilly country with basaltic lavas of the Deccan Trap age and soils black clay, shallow clay loam, heavy black and gravelly. In S.W.M.P. the rainfall is between 32 inches and 49 inches per annum. It is composed of flat topped plateau and hills with basaltic rocks of Deccan Trap. The soil is black clay with some patches of deep heavy black.

At one time, the districts of Berar, viz, Amravati, Akola, Buldana and Yeotmal, were producing considerable quantities of wheat and gram but with increasing difficulties of irrigation and rainfall and with the rise in the prices of cotton, these crops have been replaced to a considerable extent by cotton cultivation as pointed out by the Central

Provinces Provincial Banking Enquiry Committee. (1) There were only 88 tanks in Berar in 1952 as will be found in the above table.

The area irrigated by irrigation tanks in Wainganga tract is on an average 20 acres per tank even in the year when the rainfall is favourable. Against this the Chhattisgarh irrigates only ten acres. Total area irrigated by all the three types of tanks in Madhya Pradesh was 743,563 acres in the year ending the 31st May, 1952. (2)

Kharung and Maniari tanks were major works which were completed in 1928 and 1930 respectively. In 1944-45, the area irrigated by Kharung tank was 79,161 acres while by Maniari tank 61,913. (3) Since then the area irrigated by Kharung tank has increased and was 96,637 acres in 1952-53 and of Maniari tank to 78,358 acres. (4)

There are 6 major irrigation tank projects in execution in the State as is shown in the table given below. When they are completed the area irrigated would be 335,625 acres and the estimated rise in output in food grains 67,125 tons. (5)

- 
- (1) The C.P. Provincial Banking Enquiry Committee, 1929-30, Calcutta 1930, Vol. II, Appendix J-1, p.541.
  - (2) Table of Agricultural Statistics, op. cit., Table IIIB, p.4.
  - (3) River Training and Irrigation, op. cit., p.125.
  - (4) The Times of India Yearbook, op. cit., p.695.
  - (5) Ibid. p. 695.

Table No. 13.

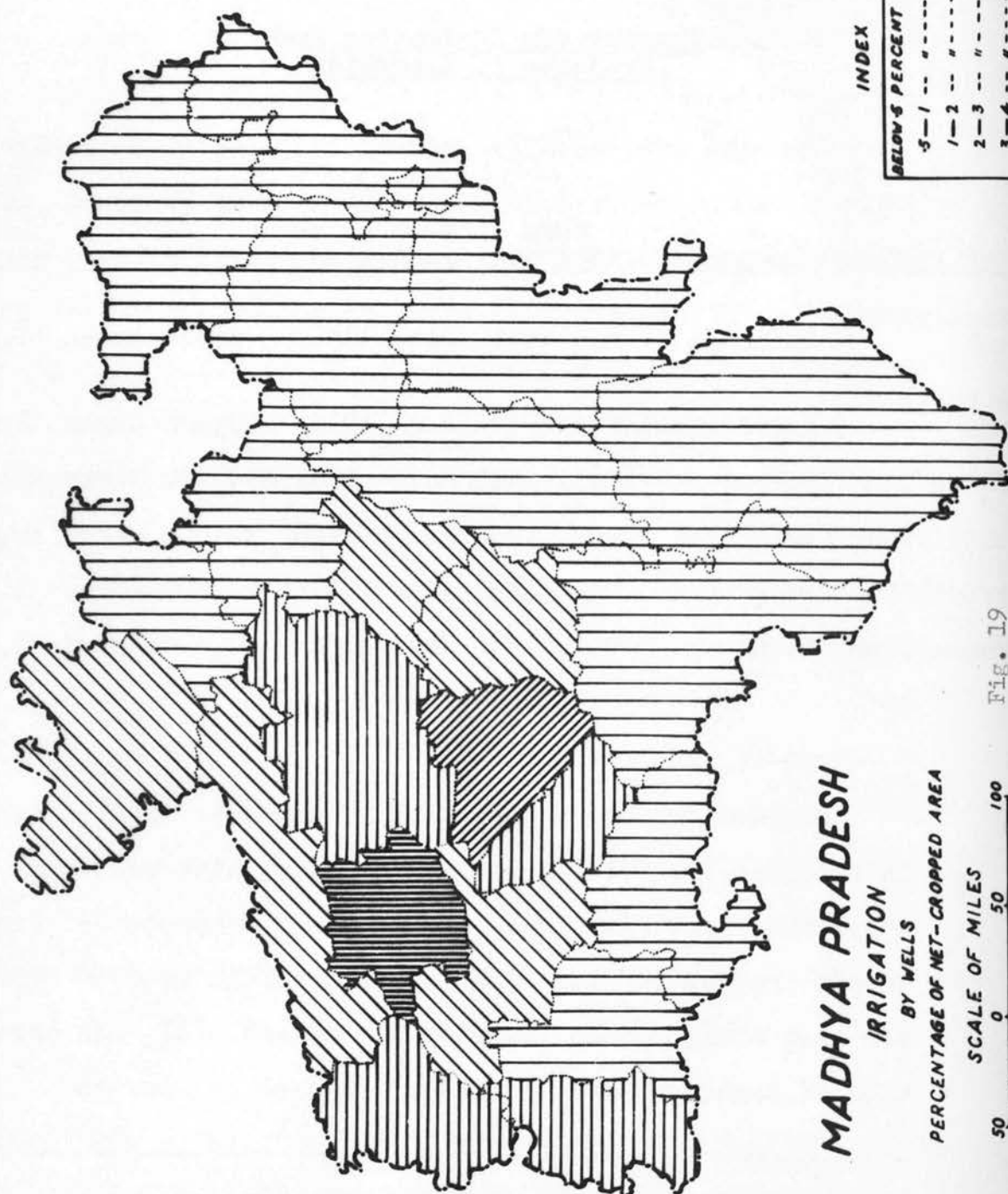
Showing the Irrigation Tank  
Projects in Execution

<u>Name of Project</u>	<u>Location</u>	<u>When Started</u>	<u>When to be completed</u>	<u>Area Proposed for Irrigation</u>	<u>Estimated Rise in Output after completion</u>
1. Gangulpara Tank	Balaghat	May 1953	June 1956	8,525 Acres	1,705 tons
2. Durkrikheda Tank	Hoshangabad	May 1953	June 1956	6,600 Acres	1,320 tons
3. Dudhwa Tank	Raipur	Oct. 1953	March 1963	240,000 Acres	48,000 tons
4. Gondli Tank	Durg	Oct. 1953	March 1958	50,000 Acres	10,000 tons
5. Sarodha Tank	Durg	Oct. 1953	June 1957	21,000 Acres	4,200 tons
6. Sampna Tank	Betul	Oct. 1953	June 1956	9,500 Acres	1,900 tons
Total				<u>335,625 Acres</u>	<u>67,125 tons</u>

Besides the above there are 17 minor irrigation works in progress. (1) The Aree Tank Project which was taken up under the First Five Year Plan has been completed. The Saroda Project on which work was started in October 1953 has been changed into the Bargoor Project. (2) The execution of these projects in Madhya Pradesh is slow and

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(1) The Times of India Yearbook, op. cit., p.695.  
 (2) Ibid, p.108.



# MADHYA PRADESH

## IRRIGATION

BY WELLS

PERCENTAGE OF NET-CROPPED AREA

SCALE OF MILES



INDEX

BELOW 1 PERCENT
5-1
1-2
2-3
3-4

Fig. 19

"works are behind schedule". According to the Plan the area to be irrigated in 1951-54 was to be 21,000 acres and the actual achievement was only 10,000 acres. (1)

(3) Wells. (Fig. 19) Well irrigation has definite advantages of its own. It makes up ~~up to~~ 11.8% of the total irrigated area in Madhya Pradesh (225,204 acres out of the total irrigated area of 1,907,067 acres in 1952). (2) Well irrigation is more suitable to the peculiarities of the soil and crop. Because the well water entails trouble on the part of the cultivator in raising it, he is naturally careful and economical in its use, much more than when water is brought to his door, and a charge for it made more or less compulsory. Two estimations have been made. One is that "Well water does three times as much duty as canal water" and the other, "well-irrigated land produces at least one-third more per unit than canal-irrigated land." (3) The cost of lifting water makes the well water used for high grade crops.

According to the Imperial Gazetteer there were 65,000 irrigation wells in 1908 and the area irrigated was about

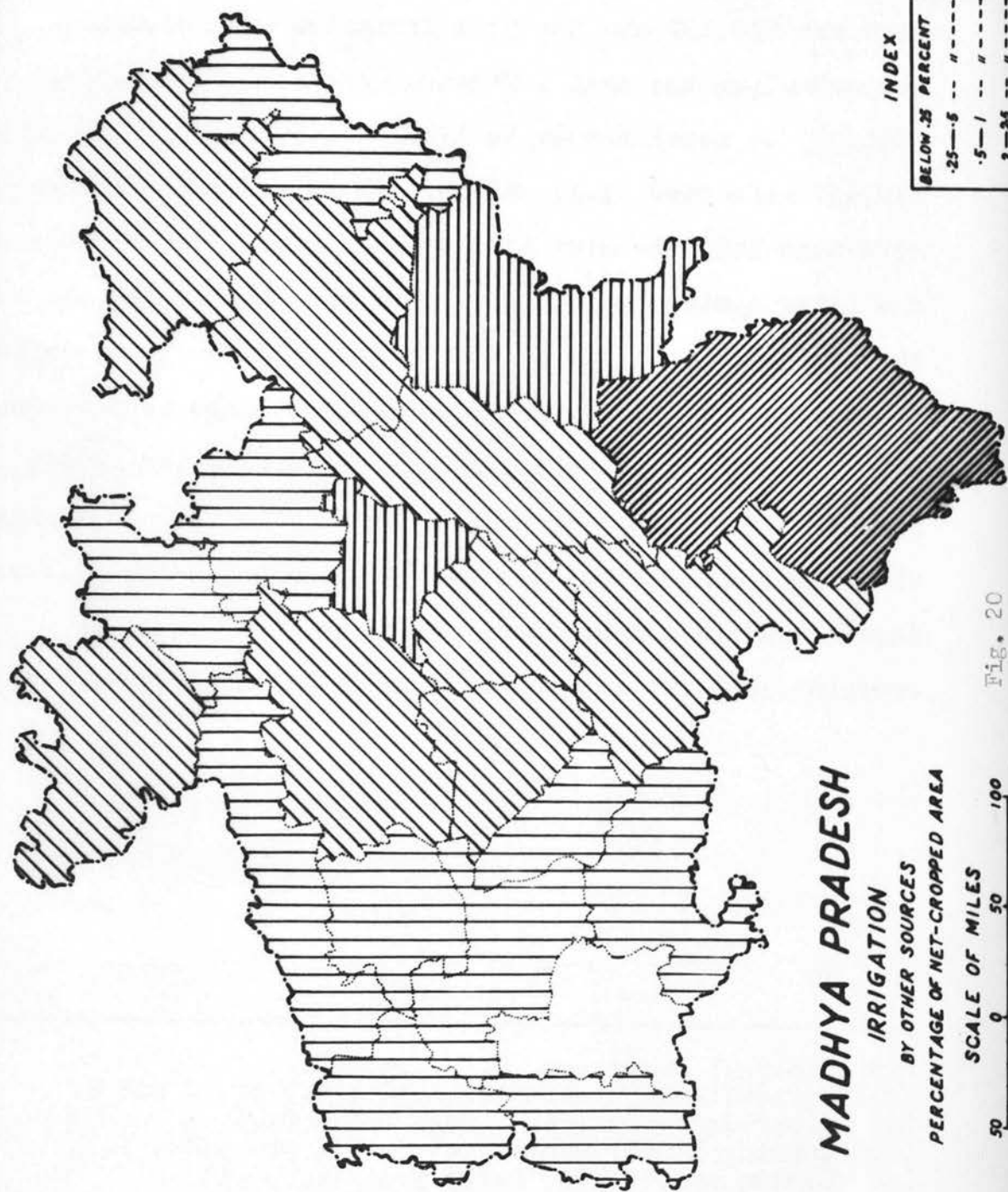
(1) Imperial Gazetteer, C.P., op. cit., p.43.

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- (1) The Times of India Yearbook, op. cit., pp.108 and 109.  
 (2) Tables of Agricultural Statistics, op. cit., p.4.  
 (3) River Training and Irrigation, op. cit., p.23.

1 1/3 acres to each well. (1) In 1952 the number of wells used was 230,157 and the area irrigated was 225,204 acres. (2) Thus the area irrigated came to 0.97 acres per well. The total number in 1952, was 372,002, out of which 230,157 were used, i.e. only 61.86% were used. Rather more than half the area irrigated from wells is for wheat and other spring crops, and the balance for sugar-cane and garden crops. It was as far back as 1909 that the depth of permanent wells dropped from 20 to 90 feet as mentioned in the Gazetteer of Berar. (3) Well irrigation is not popular in the State because of the difficulty of raising the water, more especially as the water table has fallen. (4) Another reason can be found if we study the trend of cropping in Berar for the last three decades as shown below. (5)

- 
- (1) Imperial Gazetteer, C.P., op. cit., p.45.
  - (2) Agricultural Statistics, op. cit., pp. 2 and 4.
  - (3) Berar Gazetteer, 1909, op. cit., p.31.
  - (4) Banking Enquiry Report, Vol. II, op. cit., p.541.
  - (5) Census Report, op. cit., p.143.





INDEX

BELOW .25 PERCENT	.25-.5	.5-1	1-2	2-3.5
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## MADHYA PRADESH

IRRIGATION  
BY OTHER SOURCES  
PERCENTAGE OF NET-CROPPED AREA

SCALE OF MILES  
50 100

Fig. 20

to be used when mostly Table No. 14. of the total irrigated

Showing the trend of cropping in Berar  
for the last three decades for important crops

(in '000 acres)

<u>Year</u>	<u>Rice</u>	<u>Wheat</u>	<u>Gram</u>	<u>Juar</u>	<u>Cotton</u>	<u>Groundnut</u>
1920-21	36.32	266.04	91.34	2,332.40	3,090.20	3.38
1930-31	22.88	286.48	88.64	2,234.92	3,349.84	61.22
1940-41	43.64	371.80	101.70	2,292.92	2,518.52	155.94
1950-51	64.76	299.54	119.92	2,403.70	2,224.04	457.50

We find a fall in the area of wheat and gram and an increase in the cotton and groundnut areas. Short staple cotton, juar and groundnut need much less rain and moisture and besides they cannot be irrigated by wells.

In areas where canal irrigation is not possible, such as in major areas of Berar, it is essential to depend on well irrigation. To overcome the above mentioned difficulties and make it popular tube wells are to be introduced. This can be done either by electricity or by diesel engine. The Government of Madhya Pradesh has realized their importance and recently sanctioned the installation of 500 pumps for agricultural purposes.

(4) Other Sources. (Fig. 20). These include bund and embankments of fields and small storage of rain water

to be used when mostly needed. Out of the total irrigated area of 1,907,067 acres in 1952, the area irrigated by 'other sources' was 110,351 acres, i.e. 5.8%.

Conclusion. The percentage of area under irrigation to the net cropped area in this State is much below the All India average. The development of agriculture into an organised industry will only be possible when the element of uncertainty which exists at present, is substantially reduced.

From an irrigation point of view the Narmada, Tapi, Wainganga, Sheonath, Hasdeo and Mahanadi are interesting. Irrigation works have actually been built on the Wainganga and the Mahanadi. There are four river projects under investigation by the Central Government. Besides some preliminary investigation has been carried on the Narmada and Tapi. When these two rivers develop they will be multi-purpose for irrigation, flood control, navigation and power. (1)

Tube wells are to be extended in areas where canal or tank irrigation is not possible, especially in Berar.

Commenting on irrigation development the Development Plan of the C.P. and Berar remarks that the "experience of

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(1) Water Resources of India: Their Conservation and Utilization, Central Waterways & Navigation Commission, New Delhi 1947, p.14.

irrigation projects in this Province has been unhappy from a financial viewpoint and according to pre-war standards most projects have been failures. This is not the only way to look at such projects for they have definitely increased the wealth and prosperity of the province, they afford almost complete protection against famine in the commanded areas and they increase the revenue of the Government indirectly". (1)

The Nagpur oranges are famous all over the country. In short, the State has plenty of raw materials. Nevertheless, Madhya Pradesh is industrially backward. Various factors are responsible for this. But the greatest of them is probably the want of electric power. The supply of cheap and abundant electric power is the first requisite for the economic development of the State. Unfortunately in the past not much attention was paid towards it as is evident from the table given below. (2)

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(1) Outline of Development Plan of the C.P. and Berar, Nagpur 1945, pp. 9 and 10.

(2) Public Electricity Supply: All India Statistics, 1954, Govt. of India, Delhi 1955, Tables XXXIII and XXXIV, pp. 31 and 32.

### Section C - Power Resources

*Showing electricity generated in various*

The State of Madhya Pradesh is endowed with rich natural resources. It has large deposits of iron, bauxite, manganese and coal. It has large forest areas growing timber and many other forest products. In agriculture, the State grows rice, wheat, jowar (Indian millet) and dals (pulses) and is rich in cotton. The Nagpur oranges are famous all over the country. In short, the State has plenty of raw materials. Nevertheless, Madhya Pradesh is industrially backward. Various factors are responsible for this. But the greatest of them is probably the want of electric power. The supply of cheap and abundant electric power is the first requisite for the economic development of the State. Unfortunately in the past not much attention was paid towards it as is evident from the table given below. (1)

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(1) Public Electricity Supply: All India Statistics, 1954, Govt. of India, Delhi 1956, Tables XXXIII and XXXIV, pp. 31 and 32.

Table No. 15.

Showing electricity generated in various  
states of India, during the year 1954

<u>State</u>	<u>Total Kwh generated (in millions)</u>	<u>Total sold to ultimate consumers (Kwh millions)</u>
Bombay	2,283.675	1,879.833
Bengal	1,462.329	1,337.870
Madras	899.296	733.651
U.P.	620.944	489.047
Bihar	312.107	188.714
Punjab	220.849	145.451
M.P.	186.767	156.161
Andhra	102.037	85.277
Orissa	11.813	8.272
Assam	8.637	7.114

It was only half a century ago in 1905 that the first electric licence was granted to supply power to the capital town of Nagpur. Gradually, other electric supply companies sprang up in important towns of the State, mostly in the district headquarters. These operated within the municipal limits of the towns. Progress was slow till 1937. The second licence was granted 20 years after the first licence followed by 23 licences in the next 13 years, that is till



1938. (1) The first attempt at large scale electrification was made after 1937-38 when Central Provinces Industrial Syndicate requested a licence for the electrification of the Nagpur, Wardha and Chanda districts. The outbreak of the Second World War checked the progress of the scheme. By 1938, twenty-five stations were supplying electricity in the State. It was confined to certain important towns, where it was applied to flour mills, saw mills or small factories. (2) Large mills had their own plants even in towns, as it was cheaper for them to produce their own power than to purchase from Government licensees. If the dispersal of industries to villages is the policy of the Government, electricity must reach the villages as soon as possible. In this direction some attempt has been made during the last few years.

The most important aspect of electrification in India is the spread of electricity to villages. Rural electrification sees the decentralisation of industries and location of industrial units in villages. However not much progress has been made in the past in extending rural

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- (1) Mackie, Lt.Col. E. G., Development of Electricity in M.P., Census of India, Vol. 7, M.P. Part IA Report, Appendix M, Part II, p.360.  
 (2) Ibid, p.360.

electrification in India as "the immediate profit motive inherent in private enterprise discouraged extension of their activities to rural areas where the financial returns are not as good as in urban areas". (1)

The standard of living of the common man cannot be raised unless electricity is extended to rural areas as soon as possible, especially in view of the fact that more than 80% of the population lives in rural areas. Not merely the extension of electricity, but its cheapening is a prerequisite for economic development. No doubt tubewells can be powered by oil or steam engines, but electricity could also be used, and used economically. If power in rural areas is available, industries can be dispersed. The U.N. Report on Rural Electrification is right when it says that "industries may be established wherever raw materials are available and the concentration in industrial centres, with all the consequent social, sanitary and labour problems, which yet remain unsolved in large industrial towns, can be avoided." (2)

The population which lives in villages in Madhya Pradesh is 87% of the total and more than three-quarters

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- (1) Rural Electrification - U.N. Department of Economic Affairs, U.N. Publication, July 1954, p.7.  
 (2) Ibid, p.7.

of the entire population is engaged directly or indirectly in agricultural pursuits. Yet for more than one-third of the year the cultivators remain idle. If improved methods of agriculture are introduced, there will be a surplus manpower. For them alternative employment should be found, if the standard of living is to be raised. Therefore, there is need for a rapid expansion of village industries which can be done only if cheap electricity is provided in the home. The U.N. Report says that "the introduction of electricity into rural areas, and the introduction of the improved tools required for the cottage industries with financial and technical assistance, will provide employment for the population all the year round, which will be a real step forward in the economic uplift of the country." (1)

Later on when the economic condition of the rural population increases there will be many other uses to which electricity may be put in, viz., farm power supply, grain-drying, grass-drying, dairy farming, feed-processing, poultry farming, fruit growing and horticulture (for market gardening and nursery work).

In short, the importance of electricity, especially

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(1) Rural Electrification, op. cit., p.35.

in rural areas, cannot be over-emphasised if India wants to improve the economic conditions of the masses. The State has realized the importance of rural electrification and had made a beginning in this direction. But still much is desired. In 1953, 66 places in Madhya Pradesh had electricity, out of which 52 were small towns and villages. (1) On the 26th January 1955, one more district town (Hoshangabad) and 28 villages were supplied electricity. (2)

1. Hydroelectric Power Possibilities. In Madhya Pradesh, the hydroelectric power resources are restricted, since, situated in the centre of India, it is a kind of watershed from which water quickly drains away. Most of the rivers of the State are not perennial, except the Indravati, Narmada, Tapi and Mahanadi, consequently storage will be necessary. Barlow writes in the Preliminary Report that "sites for reservoirs exist plentifully, but will not be cheap to develop". (3) Further he says that "the plateau of the Central Provinces ... undoubtedly offer possibilities which are well worth examination". (4) Barlow

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- (1) Public Electricity Supply: All India Statistics, 1953, Government of India Ministry of Power and Irrigation, Simla 1955, p.200.
  - (2) A Short Note on Electricity Development in M.P., Nagpur 1955, pp. 5 and 6.
  - (3) A Preliminary Report on the Water Power Resources of India, 1918-19, Hydroelectric Survey of India, Calcutta 1919, p.42.
  - (4) Ibid, p.10.

is right when he says that "it is strongly held in the Province that for any large project the combination of irrigation from the reservoirs should be combined with power, and that this combination may be financially successful when neither might be so alone". (1) These recommendations were made about 40 years ago but during this period not much survey work has been done to find out the potential water power resources of the State.

The first hydroelectric survey of India was made in 1918-19 by the Government of India. According to the findings of this Survey there are many sites suitable for reservoirs. The Preliminary Report recommended 48 sites for further investigation and which seemed to promise hydroelectric power possibilities. (2)

Davies was deputed for duty on the hydroelectric survey of the State. He made a survey of six sites, out of which four were mentioned in the Preliminary Report and the other two came to light after the publication of the Report. (3)

In the Triennial Report, Mears, Electrical Adviser to the Government of India, says that "the work done so far in

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A Preliminary Report on the Water Power....,

(1)/ Op. cit, p.42.

(2) Ibid, Appendix X, pp. 84-88 and Addenda, pp. 107 and 108.

(3) Second Report on the Water Power Resources of India, 1919-20, Calcutta 1920, p.72.



the Central Provinces is mostly entered under the head of 'sites worth detailed investigation'." (1) Subsequently as a result of reconnaissance survey a number of these sites was rejected as not worth further investigation, and in paragraph 102 of the Triennial Report of the Water Power Resources of India, Mears gave details of 17 suitable sites. (2)

While the Survey was being conducted by the Government of India the Montagu-Chemsford Reform was introduced in October 1920. According to that "all outlay on water storage and water power will be a provincial charge and the necessary provision for hydroelectric surveys should therefore be made in the provincial estimates from and after 1921-22". The result of this Reform was that no further progress was made by the Provincial Governments due to financial stringency and the whole matter was put in cold storage. But in 1945 the Central Waterways, Irrigation and Navigation Commission and the Central Technical Power Board were set up by the Central Government. The function of the Board is "to collect and collate data for the systematic employment of all the water power resources of

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(1) Triennial Report on the Water Power Resources of India, 1919 to 1921, Calcutta 1921, p.89.

(2) Triennial Report, *ibid*, p.128.



the country. (1)

The Provincial Industries Committee, Central Provinces and Berar, selected seven sites of more importance and included one more at Totla Doh suggested by Tatas and pointed out their importance in the economic development of the area served by them. The sites selected and the estimated power are given below. (2)

<u>S.No.</u>	<u>River or site</u>	<u>Approx. location</u>	<u>Continuous Estimated power in KW</u>
1	Narmada river, Mandla district	About 50 miles S. of Jabalpur	11,000
2	Silgi Kasaha and Sankul Nadi, Jabalpur	About 48 miles S. of Jabalpur	7,000
3	Mahanadi, tribut- ary of the Son	About 26 miles E. of Jabalpur	2,550
4	Totla Doh on the Pench	About 35 miles N. of Nagpur	8,000
5	Sillewani Ghat on the Kanhan	About 54 miles N. of Nagpur	13,400
6	Penganga river near Dhanki, Yeotmal	About 60 miles S. of Yeotmal	11,000
7	Indravati river, Chetrakot falls, Bastar	About 23 miles W. of Jagdalpur	60,000
8	Tapi river	Near Burhanpur	15,000-20,000

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- (1) Brown and Dey, India's Mineral Wealth, Bombay 1955, p.675. <sup>Op. Cit.</sup>
- (2) Report of the Provincial Industries Committee, C.P. and Berar, Nagpur 1945, p.16.

If the above mentioned sites are developed, the continuous estimated power will be between 127,950 and 132,950 KW.

The first three sites will be of great help for the industrial development of the Katni-Jabalpur area. The Totla Doh and Sillewani Ghat projects will supplement the Nagpur power and will be for the industrial exploitation of the Nagpur area. The Penganga and Tapi projects will be of great use to Berar for developing its textile and other industries. The Indravati site, if developed, will be beneficial for Chhattisgarh for the development of heavy industries in the Durg-Raipur area.

In the beginning of 1945, Sir Henry Howard, Consulting Engineer to the Government of India, in his Report "commented on three of these projects which he considered the most promising, and recommended the surveys should be undertaken as soon as convenient". (1) The three projects recommended by Sir Henry are:-

1. The Totladoh on the Pench River,
2. the Sillewani Ghat on the Kulbhera river, and
3. the Penganga in the Yeotmal district. (2)

The total output of these projects would be between 66,300 and 71,300 KW on 50 per cent load factor. (3)

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(1) Lydall, Francis, Hydroelectric Development in India, London, 1946, p.9.  
 (2) Ibid, p.9.  
 (3) Ibid, pp. 9 and 10.

In the Report of the Ministry of Irrigation and Power for 1955-56, the following projects in Madhya Pradesh have been taken up for investigation. (1)

1. Hasdeo River Project,
2. Panch Kanhan Canal Project, and
3. Upper Wainganga Project, and
4. Bagh River Project.

Besides the above, the central Waterways, Irrigation and Navigation Commission "has taken up preliminary investigations of the multi-purpose development of the two big rivers - the Narmada and the Tapi". (2)

In the First Five Year Plan (1951-52 to 1955-56) the aim was to complete "the various projects which are now in progress and provide for the further development of the economy on a planned basis with the available resources". (3) Unfortunately there had been no river project in progress in Madhya Pradesh at the time of the launching of the first Plan. Hence, there was no river projects from Madhya Pradesh incorporated in the Plan. In the Second Five Year Plan, the Tawa multi-purpose project has been incorporated.

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- (1) Report of Ministry of Irrigation and Power, 1955-56, Indian Journal of Power and River Valley Development, Vol. VI, No. 5, May 1956, Calcutta, p.18.
  - (2) Hydrological Study of Tapi Valley, Part I (Rainfall Study), Govt. of India Central Water and Power Commission, New Delhi 1951, p.1.
  - (3) The First Five Year Plan, Govt. of India Planning Commission, Delhi 1951, p.35.

On its completion, the area irrigated will be 590,000 acres, and output of hydroelectric power will be 30,000 KW. (1) The latest situation is that the Government has taken up two projects - Chambal (District Hoshangabad) and Tawa (District Jabalpur). The Chambal Project, when completed, will irrigate an area of 1,410 thousand acres and produce electricity to the extent of 202,500 KW. (2)

2. Thermal Power. Hydroelectric power potentialities of Madhya Pradesh may be controversial but there is no doubt that the State possesses huge deposits of coal and can develop thermal power to the full requirements of the State.

Recently the Government made a radical change in its policy for electricity supply and development. The present policy is the "rationalization of electricity within the State in the most efficient and economical manner". (3) The present policy includes the nationalization of the industry in gradual stages and electrification of rural areas. (4)

To supply electricity throughout the State of Madhya Pradesh, the whole State has been divided into four Grid

(1) A Short Note on Electricity Development, op. cit., p. 2.

- (1) The Second Five Year Plan, Govt. of India Planning Commission, Delhi 1956, pp. 363 and 366.
- (2) The Times of India Directory and Year Book, 1957-58, Bombay, p. 761.
- (3) A Short Note on Electricity Development, op. cit., p. 1.
- (4) Ibid, p. 1.

areas, namely (1) Northern, (2) Southern, (3) Eastern, and (4) Western. In each Grid one or two major power stations are to form the nucleus of development. In course of time these will be linked to water power stations in the area, will obtain inter connection amongst themselves through a system of State trunk lines with neighbouring state systems at state borders, and will be connected to an all-India network at appropriate locations when it develops.

The main power stations of the Grid System, completed and under construction as in 1955 were:- (1)

- |                |   |
|----------------|---|
| 1. Khaperkheda | 30,000 KW installed capacity completed.   |
| 2. Raipur      | 4,000 KW completed and 4,000 KW extension |
| 3. Chandni     | 17,500 KW completed                       |
| 4. Ballarshah  | 22,500 KW under construction              |
| 5. Itarsi      | 3,000 KW under construction               |

Ballarshah and Itarsi Power Stations on completion at the end of 1955 made a total installed capacity of 26,250 KW (2).

The major power stations in operation with production in 1953 are given in the table below:- (3)

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- (1) A Short Note on Electricity Development, op. cit., p.2.  
 (2) Indian Yearbook, op. cit., p.697.  
 (3) Ibid, p. 696.

<u>Name of Station with location</u>	<u>Installed Capacity in KW</u>	<u>Production in 1953 (in million units)</u>
Central Thermal Station, Khaperkheda	30,000	100.58
Pilot Power Station, Raipur	4,000	50.70
Chandni Power House, Chandni	17,000	30.04
Power House, Jabalpur	13,250	24.00
Power House, Katni	3,300	5.16
Integrated States Power Houses	2,000	1.98
Total	69,550	212.46

There are certain power projects which have been planned but not yet executed. The plans are:- (1)

1. Extension to Raipur Pilot Power Station, Raipur.
2. Extension to Licensee's Power House, Jabalpur,
3. Extension to Licensee's Power House, Sagar.

There was rapid expansion of electricity in the State after 1945 when the Madhya Pradesh Electricity Board was constituted. The extent of expansion can be gauged by the following facts:- (2)

In 1946, the installed generating capacity in the State was 26,485 KW which rose to 72,900 KW in 1953-54 after the Grid came into operation. It is expected that it would reach to 100,000 KW in 1955-56.

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- (1) Indian Yearbook, op. cit., p.696.
  - (2) A Short Note on Electricity Development in M.P., op. cit., pp. 3 and 4.



The electricity supply lines before the Grid was about 650 miles, while after the Grid, 1,500 miles have been added.

The units generated in 1950 were 47 million against 122 million generated by Grid alone in 1953-54. The present rate of generation is about 150 million units.

The total number of consumers rose from 23,000 in 1947 to 71,000 in 1953.

Before the Grid came into operation there were 37 places in the State having electricity. But no village had electricity. Against it in 1954, there were 106 places with electricity, out of which 67 were villages.

In the First Five Year Plan, certain thermal power projects of the State were incorporated. When these projects are completed they will give additional 55,000 KW of electricity. The projects included in the Plan are:- (1)

1. Central Thermal Station, Nagpur
2. Distribution System
3. Akola Power Distribution
4. Gondia Extension
5. Northern Grid Jabalpur-Katni.
6. Raipur Pilot Station
7. Power Station Bilaspur
8. Others

The principal power scheme completed and brought into service during the First Five Year Plan has been Khaperkheda

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(1) The First Five Year Plan, op. cit., pp. 274 and 275.

with capacity of 30,000 KW. (1)

In the Second Five Year Plan, as in the First Plan, the Government of India has taken up certain power generation schemes. As mentioned earlier in this plan, Tawa river project has also been incorporated. When these thermal projects together with the hydroelectric project are put in commission, the additional output of electricity will be 204,000 KW. The principal thermal power generation schemes in the Second Five Year Plan are:- (2)

<u>Schemes</u>	<u>Benefit '000 KW</u>	
	<u>On completion</u>	<u>In Second Plan</u>
1. Korba Thermal Station	90	90
2. Southern Grid Extension	60	60
3. Katni Power Station	20	20
4. Jabalpur Electricity Co.	4	

The first three of these schemes will be in the public sector, while the fourth represents an addition of generating plant to the private sector.

Conclusion. From the above description we find that since 1945, when the Madhya Pradesh Electricity Board was set up, a good progress in the expansion of electricity has been made. But hydroelectric development has been more or less neglected for want of requisite data. A

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(1) The Second Five Year Plan, op. cit., p.333.

(2) The Second Five Year Plan, op. cit., pp. 367 and 369.

start has been made in the Second Five Year Plan for hydroelectric development in the scheme. When the hydroelectric schemes have been constructed, they should be connected up with the thermal stations to form one single State Grid, linked up in turn with the all-India Grid System. The cost of transport will be reduced if the thermal stations are located as near as possible to the coal mines. Though electric charges have been reduced gradually during the last few years, they are still high. The supply of electricity at cheap rates and in abundant quantity are the pre-requisite of industrial development. The areas which are far away from the Grid System should be gradually provided with small thermal stations, which may ultimately be connected up with the State Grid.

To sum up, the hydroelectric study of the State is incomplete and needs detailed study. Without further detailed knowledge of the potential water power resources no definite suggestions can be given. In any event, the known hydroelectric power resources are restricted unless storage facilities are provided. There are eight prospective sites (three near Jabalpur, two near Nagpur, one near Yeotmal and one near Jagdalpur). There are two projects, the Chambal (District Jabalpur) and the Tawa (District Hoshangabad), under contemplation by the Government.

These two together will irrigate an area of two million acres and generate 232,500 KW of electricity. The State possesses very large deposits of coal and can develop thermal power to the full requirements of the State. The coal is well-distributed - the Chhattisgarh coalfield, the Satpura, the Wardha Valley and the Mahanadi, so that there is no difficulty in providing thermal power in any part of the State. Coal will not be required to be hauled to long distances. The Northern Grid will have coal from the Satpura coalfields, the Eastern from the Chhattisgarh, the Western from the Satpura and the Southern from the Wardha Valley. The Grid Stations can be linked later when water power is developed and can also be connected up amongst themselves through a system of state trunk lines. There can be small thermal stations at suitable points as stand-by to meet emergency and breakdown.

Almost the whole State will benefit by the power development. Small scale and cottage industries, which are distributed all over the State, will especially benefit. The Northern Grid will help in the industrial development of the Katni-Jabalpur area, the Eastern for the development of heavy industries in the Durg-Raipur area, the Southern textile and other industries, and the Western forest resources. The supply of electricity will help in the mineral exploitation of the plateau region also.

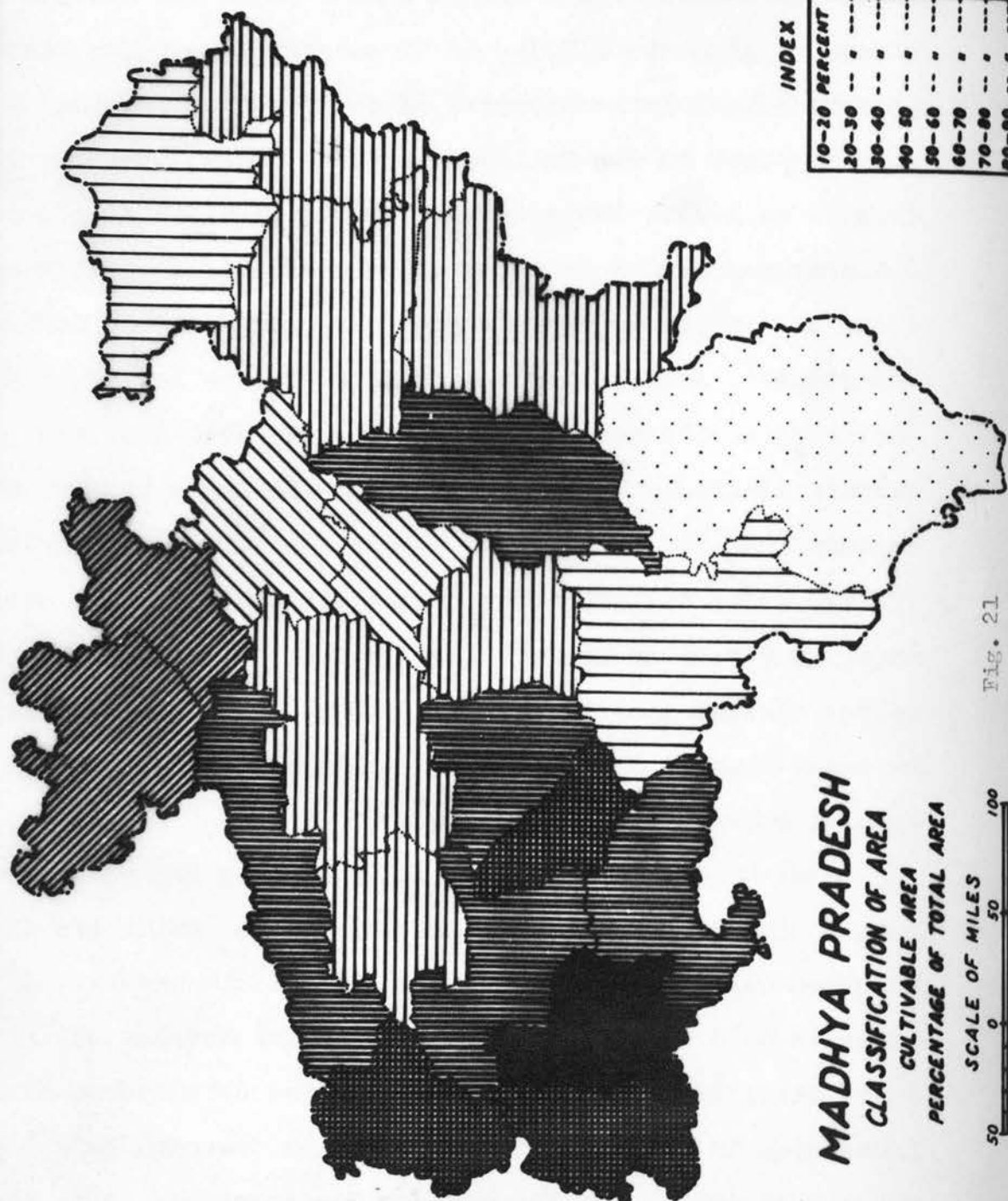


Fig. 21

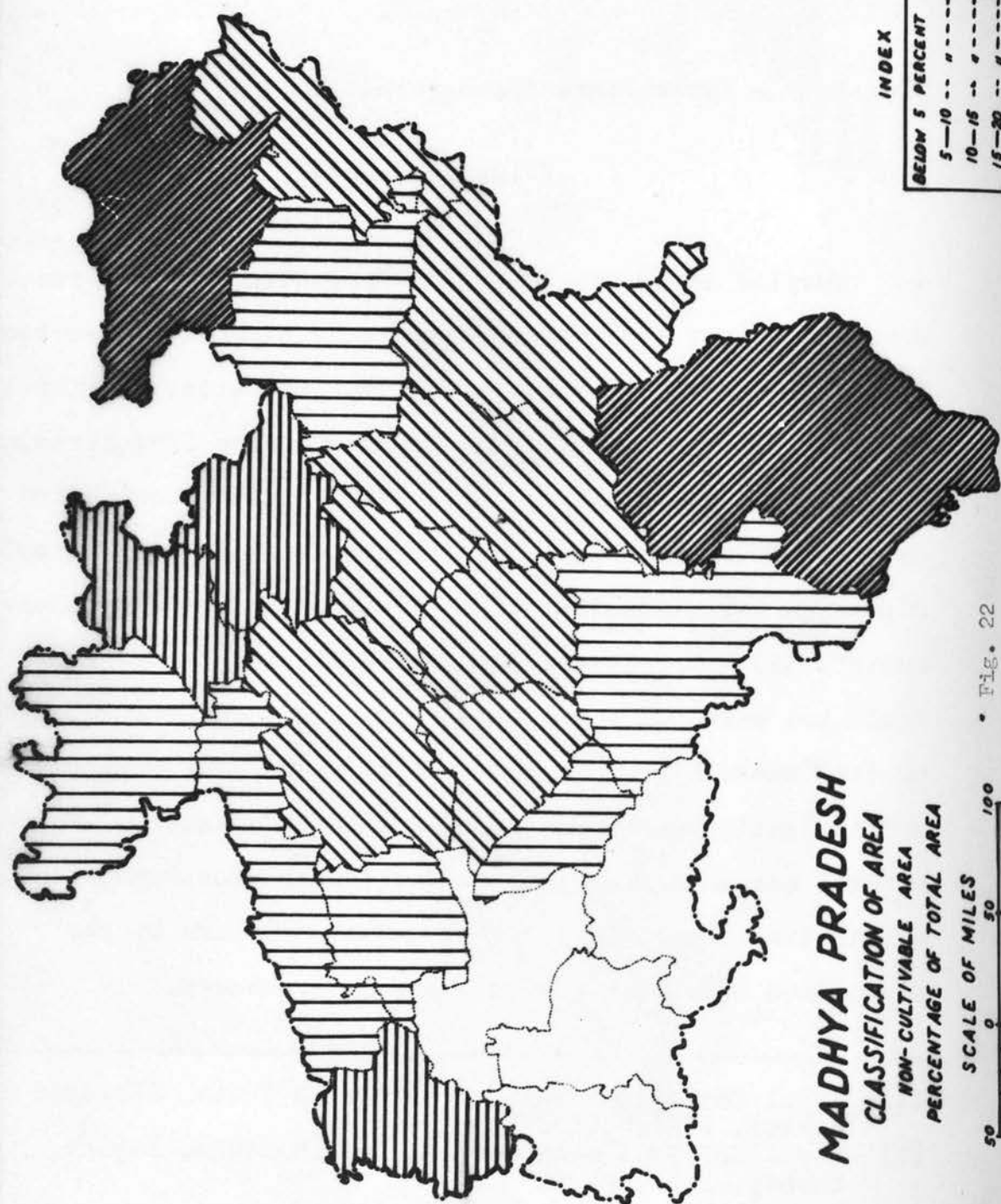
## Chapter V - Agriculture (Foodgrains)

(Figs. 21 - 52)

Despite being proclaimed as "essentially" an agricultural country by many geographers and economists, India had been deficient and is still deficient in foodgrains. Prior to the last World War, India had to import rice from Burma, Thailand and other places. In 1926, a Royal Commission on Agriculture was "appointed specifically to examine and report on the conditions of agriculture and rural economy in India". (1) But its findings were limited by the fact that it could not "make recommendations regarding the existing system of land ownership and tenancy or of assessment of land revenue and irrigation charges, or the existing division of functions between the Government of India and local Government,....." (2) Within its limitation the recommendations made by the Commission suggested far-reaching consequences.

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- (1) Royal Commission on Agriculture in India, Abridged Report, Bombay, 1928, p.i.
  - (2) Royal Commission on Agriculture in India, Report, Bombay, 1928, p. ii





Agrarian Problems. Agriculture is the main occupation of the overwhelming majority of the people of India - 68.1% of the population. (1) In 1949-50, agriculture contributed 53.6% to the national income, industry 21.7% and other occupations 24.7%. (2) Agriculture is the main source of exports, viz., jute, oilseeds and oil, tea and tobacco. India's two main industries, textile and sugar, depend on agricultural produce. The agrarian problems are many and varied which cannot be solved in isolation from the general economy of the country. The most important problems are:

1. Overpressure of the population on agriculture
2. Indebtness and poverty of the peasantry
3. Stagnation and deterioration of agriculture
4. Excessive subdivision of agricultural land
5. Old techniques and implements
6. Agricultural labour

1. Over-pressure of the population on agriculture. This is the most important problem. Fragmentation and subdivision of holdings, poverty and indebtedness, poor techniques, and obsolete implements, inferior types of seed and poor yield,

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- (1) Census of India, 1951, Vol. I India, Part I - A. Report, Delhi 1953, p. 92.  
 (2) Agrawal, A.N. - Indian Agriculture and Its Problems, Delhi 1951, p.1.

# MADHYA PRADESH

CLASSIFICATION OF AREA

CULTURABLE WASTE

PERCENTAGE OF TOTAL AREA

SCALE OF MILES  
0 50 100

INDEX

BELOW 5 PERCENT	5-10	10-15	15-20	20-25

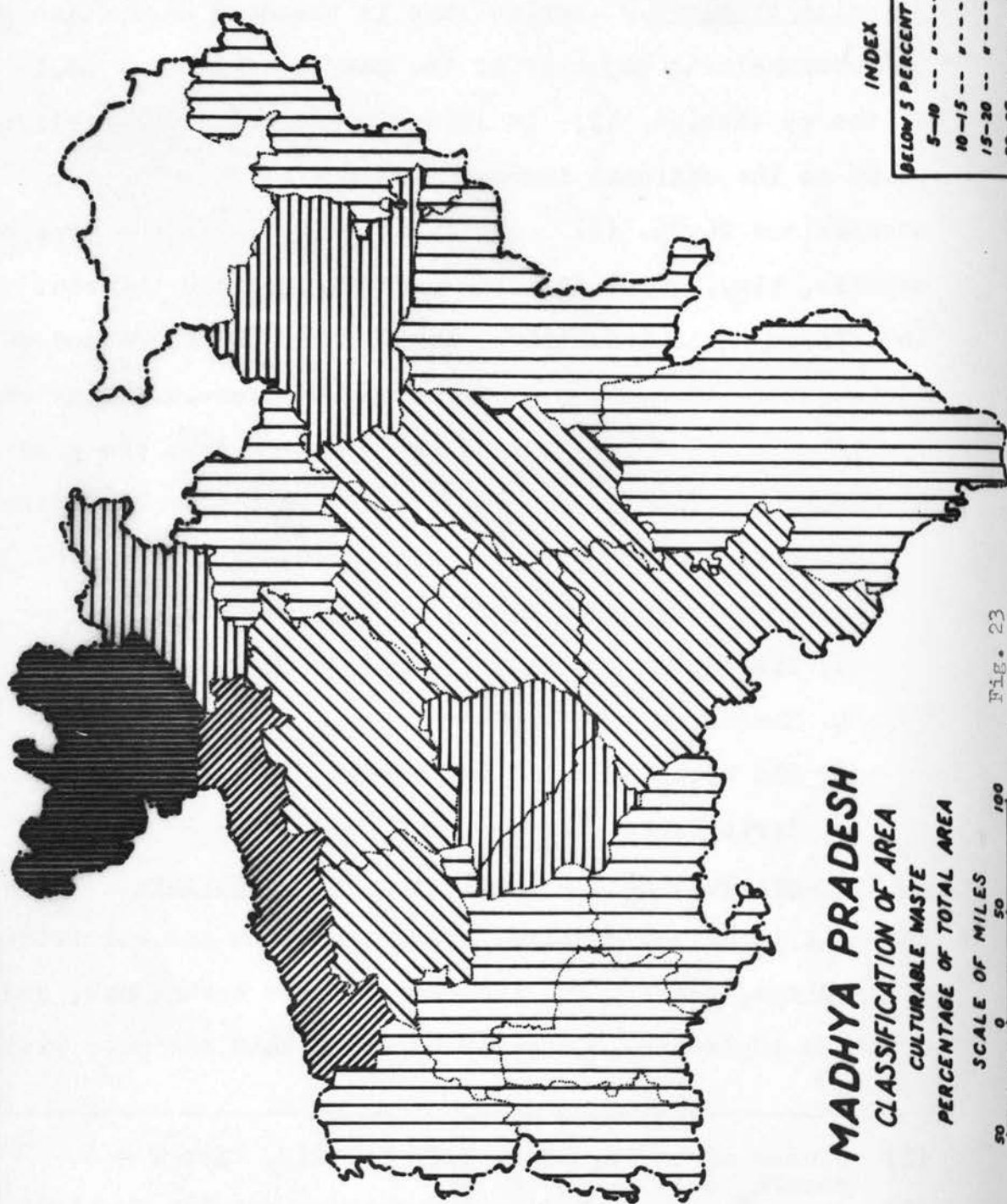


Fig. 23

large areas uncultivated for want of resources and huge numbers of landless agricultural labour are some of the consequences of this over-pressure.

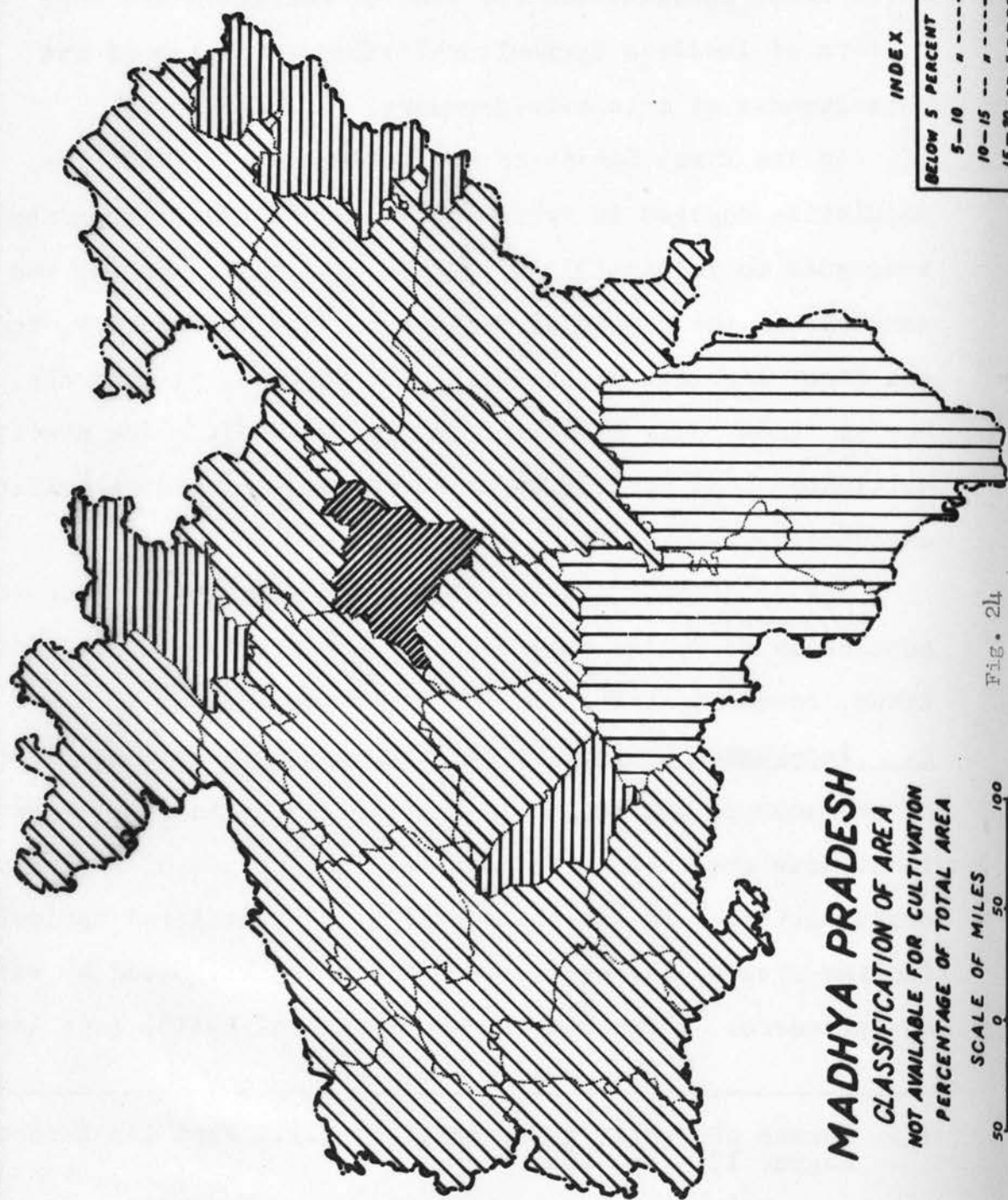
At the first Census of Madhya Pradesh in 1866, the population engaged in agriculture was 57%, which progressively increased to 76% in 1951 (Fig. 33 & 34) (1). During the same period the number of persons engaged in industry, commerce and other services decreased. (In England, by contrast, in normal times, only 8% depend on agriculture). The available cultivated land per capita is decreasing and making holdings uneconomic.

The solution would seem to lie in inducing the surplus population to follow other useful pursuits, such as, industries, trade, commerce, transport and communications.

2. Indebtness and poverty of the peasantry. The poverty of peasants is proverbial in India. The main reasons for indebteness are uneconomic holdings and absence of any kind of organisation. In the absence of a well developed agricultural banking system, the cultivators are being exploited by village moneylenders. "The Banking Commission of 1931", says Agrawal,

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(1) Census of India, 1951, Vol. VII M.P., Part I-A Report, Nagpur 1953, p. 164.



INDEX

BELOW 5 PERCENT

5-10

10-15

15-20

Fig. 24



"records a case where a farmer borrowing Rs 100/- (£7.10.Sh.) had paid Rs 1,000/- (£75) as interest, and yet the debt was supposed to be still standing." (1) The districts of Akola, Nagpur, Sagar Bilaspur, Chanda and Durg were surveyed by the Committee of the All Indian Rural Credit Survey. The proportion of indebtedness among the rural cultivators' and non-cultivators' families in the above districts is given in the table below. (2)

Table No. 16 Showing proportion of indebted rural families in certain districts of M.P.

<u>Crop Zone</u>	<u>District Surveyed</u>	<u>Percentage of indebted cultivators' families</u>	<u>Percentage of indebted non-cultivators' families</u>
Cotton	Akola	36.5	14.7
	Nagpur	61.0	36.8
Wheat	Sagar	90.2	43.8
Paddy	Bilaspur	51.3	14.5
	Chanda	74.2	42.9
	Durg	48.2	22.3

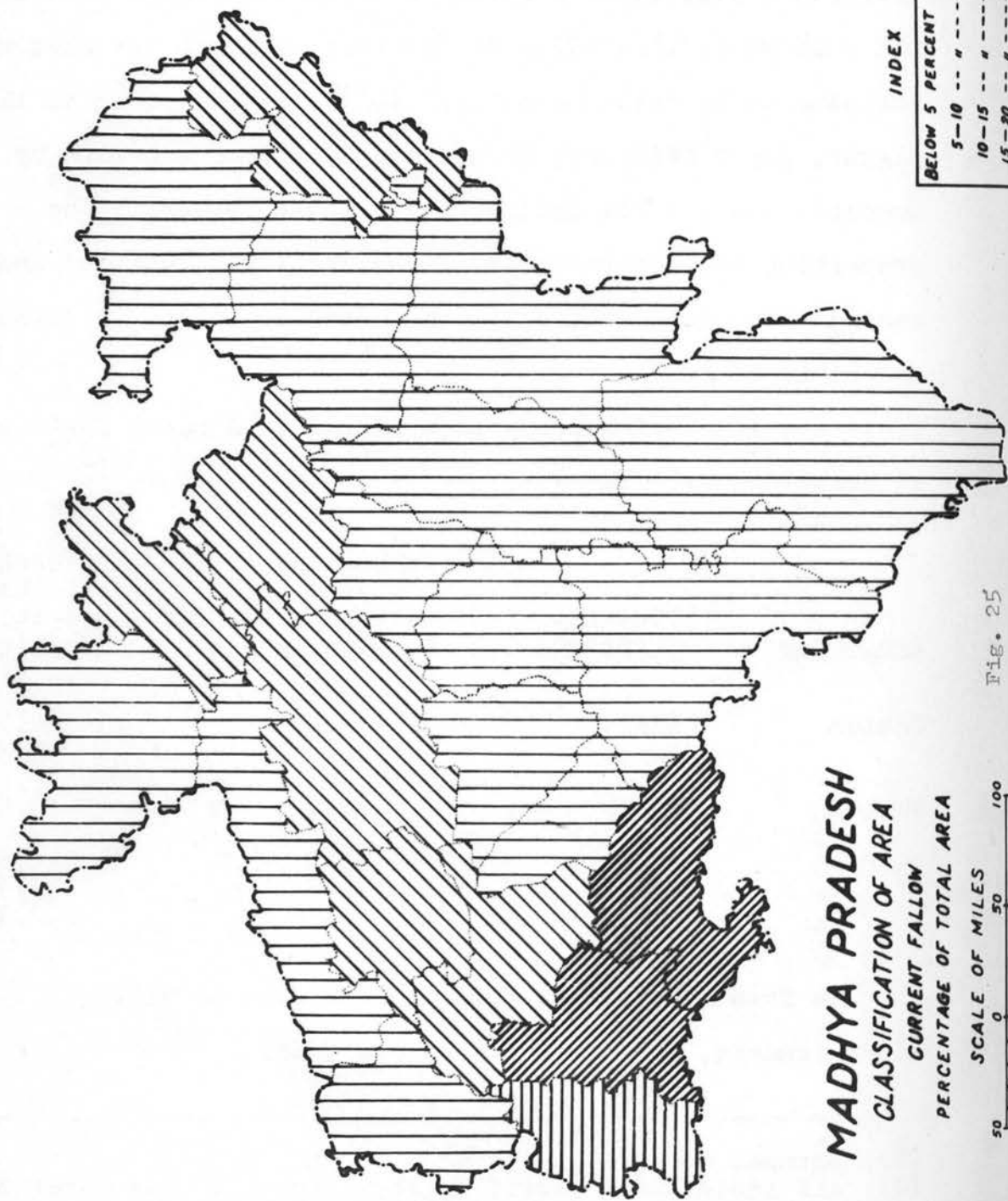
To free cultivators from the clutches of village money-lenders, some suggestions are made.

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(1) Agrawal op. cit., p. 47.

(2) All India Rural Credit Survey, Report of the Committee of Direction, Vol. I Part I (Rural Families), Bombay 1956, pp. 7-9





# **MADHYA PRADESH**

**CLASSIFICATION OF AREA**

**CURRENT FALLOW**

**PERCENTAGE OF TOTAL AREA**

**SCALE OF MILES**



## **INDEX**

BELOW 5 PERCENT	5-10	10-15	15-20
Horizontal lines	Diagonal lines (top-left to bottom-right)	Cross-hatching	Vertical lines

Fig. 25

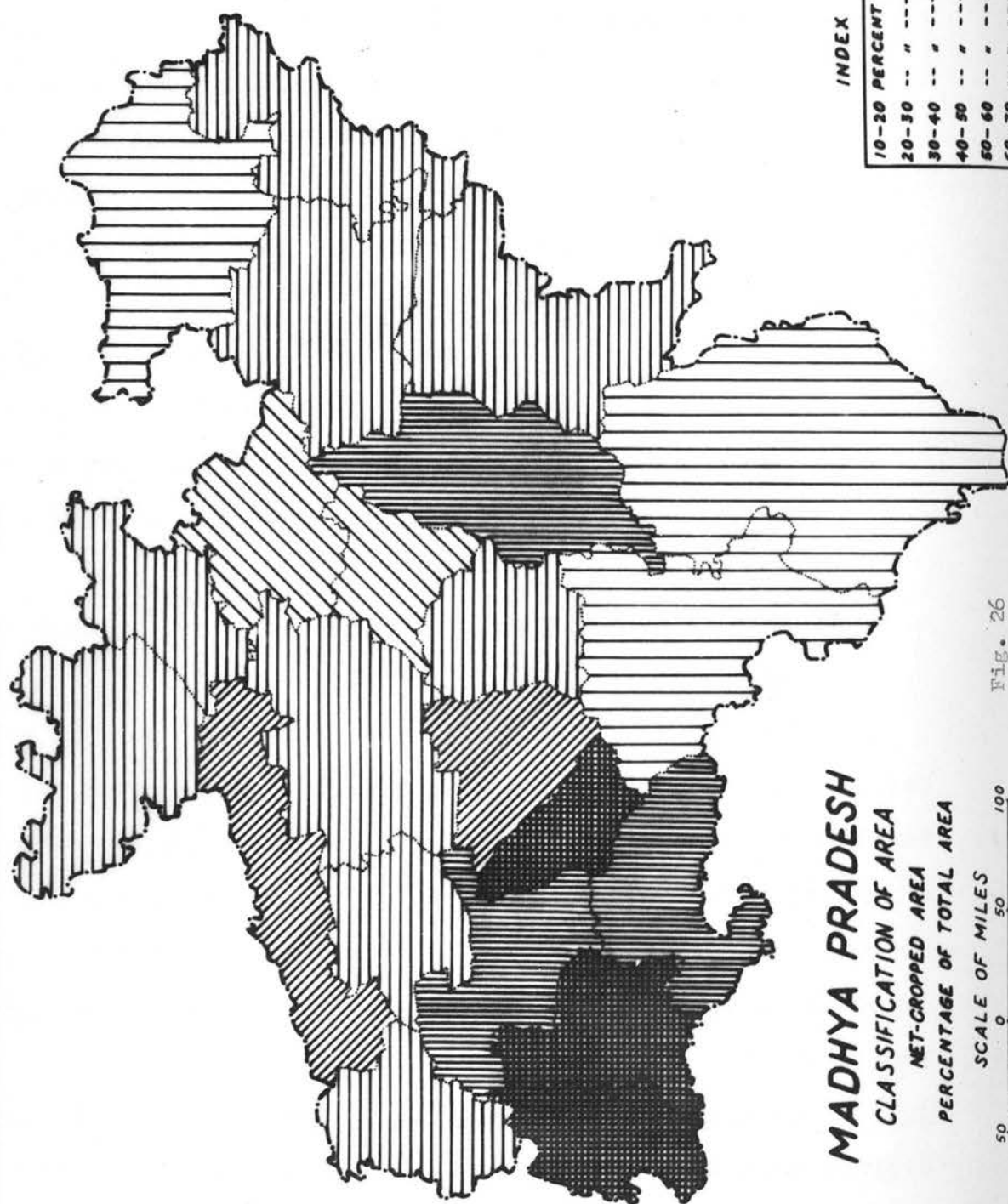
1. The creation of an Agricultural Finance Corporation.
2. Reserve Bank of India should give agricultural credit as it does in case of industrial credits.
3. The Cooperative Credit Societies should be made more active and as many new societies as possible should be established.
4. Provision should be made for licensed ware-houses, storage facilities, uniform measures and weights. These conditions will enable commercial banks to advance loans for financing movements and marketing of crops.
5. Rural savings should be used for rural finance and not/<sup>be</sup>diverted to invest in industries.

Then Agricultural Produce (Development and Warehousing) Corporations Bill introduced in the Indian Parliament in May 1956, is "for the purpose of development and ware-housing of agricultural produce on cooperative principle and for connected matters". (1) Later on, it is proposed to create cooperative societies to function as credit and marketing societies.

3. Stagnation and deterioration of agriculture. It is claimed that about 70 per cent of the available area for cultivation is wasted and only 30 per cent is used for

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(1) India News, May 19, 1956, India House, London.

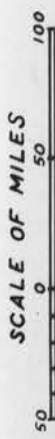


# MADHYA PRADESH

CLASSIFICATION OF AREA

NET-CROPPED AREA

PERCENTAGE OF TOTAL AREA



INDEX

PERCENT	INDEX
10-20	Horizontal lines
20-30	Diagonal lines (top-left to bottom-right)
30-40	Diagonal lines (bottom-left to top-right)
40-50	Cross-hatching
50-60	Dense horizontal lines
60-70	Dense cross-hatching

Fig. 26

productive purposes. (1) Because of their extreme poverty and the very limited resources at their disposal, the cultivators are not in a position to put this huge acreage under productive use.

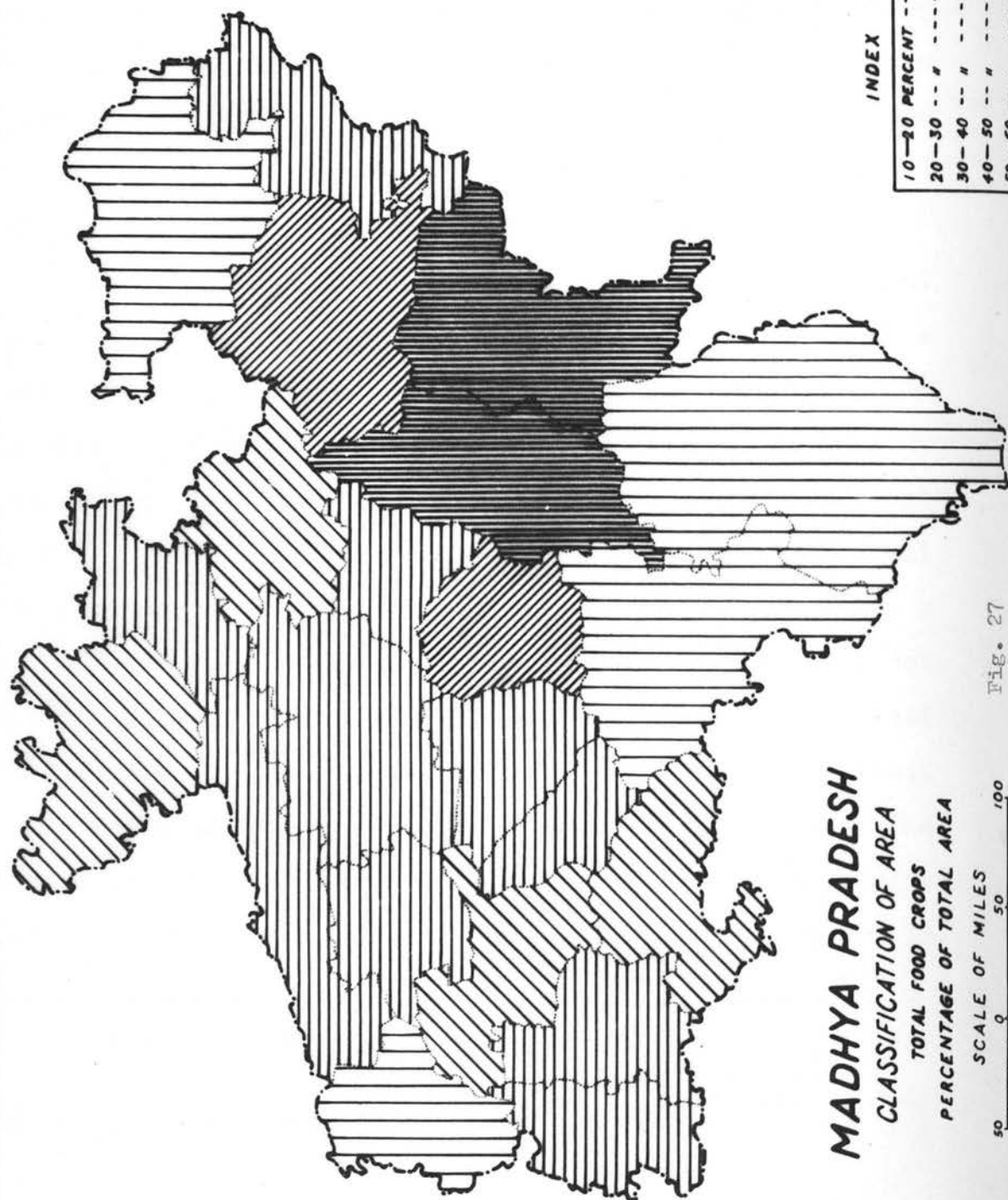
Low yield is another cause of stagnation. It is the lowest in the world, despite the fact that "the official estimates of 'normal' yield per acre, made by responsible officers, are open to grave doubt." (2) Low yield is due to absence of modern forms of cultivation, poor seed, obsolete implements, primitive techniques, little use of manure and fertilizers and inadequate irrigation facilities. Frequently a charge is levelled against cultivators for using cow-dung for fuel and not using them for manure. Owing to the limited supply of forest fuel and the high charges for its transport, "apart from preference, cow-dung is at present the only certain supply of fuel which the great majority of cultivators can obtain". (3) In the Indian region, because of the growth of population, the expansion of cultivation,

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(1) Dass, R.K. - The Industrial Efficiency of India, Calcutta, 1930, p. 13

(2) Spate, op. cit., p. 20

(3) Royal Agricultural Commission Report, op. cit., p. 264



INDEX

10—20 PERCENT	---
20—30	---
30—40	---
40—50	---
50—60	---

## MADHYA PRADESH

CLASSIFICATION OF AREA

TOTAL FOOD CROPS

PERCENTAGE OF TOTAL AREA

SCALE OF MILES

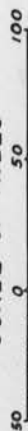


Fig. 27

the excessive grazing of goats and cattle, and the demand for wood, drastic deforestation has occurred. Despite conservation measures taken in 1855 and 1878 the process has gone so far that cow-dung must generally be used for fuel rather than fertilizers." (1)

A decrease of pressure on agriculture, liberal supplies of fertilizers and manures, cheap and abundant supplies of forest fuel, use of cow-dung as manure, and better and improved seeds are some of the remedies for stagnation and deterioration of agriculture.

4. Subdivision and fragmentation of holdings. The law of inheritance and custom are together responsible for the subdivision and fragmentation of holdings. Every heir must get "a portion of each of the different parts of the property so that all share in land of different qualities". (2) The holdings, besides being scattered, are generally very small, as is evident from the table given below. (3)

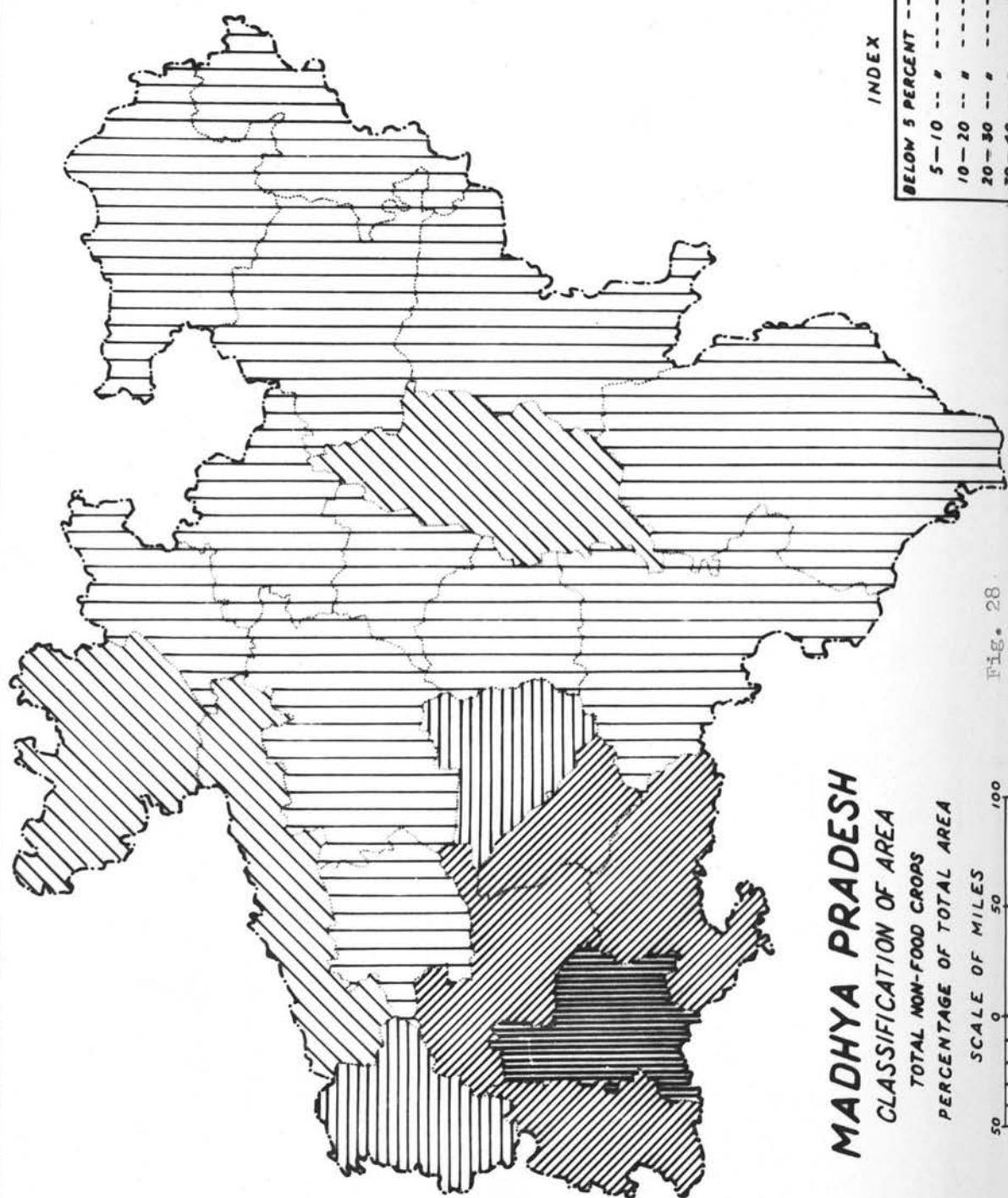
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- (1) Davis, Kingsley - Population of India and Pakistan, Princeton, 1951, p.208.  
 (2) Beuer, P.T. and Yamey, B.S. - The Economics of Under-developed Countries, London 1957, p.177.  
 (3) Second Five Year Plan, op. cit. p. 214.



Table No. 17 Showing the percentage of different grades of holdings in M.P.

		<u>Less than</u> <u>5 acres</u>				<u>Above</u> <u>60</u>	
		<u>5-10</u>	<u>10-15</u>	<u>15-30</u>	<u>30-45</u>	<u>45-60</u>	<u>Total</u>
a) <u>Area owned</u>							
Percentage of holdings	59.4	18.9	8.4	8.7	2.4	0.9	1.3 100.0
Percentage of area	13.6	16.2	12.3	21.4	10.2	5.8	20.5 100.0
b) <u>Area under personal cultivation</u>							
Percentage of holdings	60.7	18.5	8.2	8.3	2.2	0.9	1.2 100.0
Percentage of area	14.6	16.9	12.8	22.1	10.4	5.8	17.4 100.0

It will be seen that among non-cultivator owners 59.4 p.c. possess less than 5 acres and occupy about 13.6 p.c. of the area, while 1.3 p.c. of the holders having above 60 acres each occupy 20.5 p.c. of the area. Among the cultivator-owners, 60.7 p.c. have less than 5 acres with 14.6 p.c. of the area, while 1.2 p.c. have above 60 acres each with 17.4 p.c. of the area.



INDEX

BELOW 5 PERCENT

5-10

10-20

20-30

30-40

# **MADHYA PRADESH**

CLASSIFICATION OF AREA

TOTAL NON-FOOD CROPS

PERCENTAGE OF TOTAL AREA

SCALE OF MILES

50 0 50 100

Fig. 28

This problem can be solved by compulsory or voluntary consolidation of holdings or collective or cooperative farming.

Beuer and Yamey have suggested compulsory consolidation.

"The government may acquire compulsorily the scattered holdings,"

they say, "amalgamate them and resell them as consolidated

properties". (1) The success of this suggestion is open to

great doubts. The Government of India having taken over the

work of Voluntary Consolidation of holdings, has found that

progress is very slow, expensive and not very encouraging in

many of the States of India. In M.P. the progress has been

nuch better. The Consolidation of Holdings Act was passed

in 1928 and up to September 1950 the area consolidated was

2,418,815 acres in this State. (2) Till the end of September

1954, the area consolidated in M.P. was 2,694,736 acres,

covering 3,033 villages. (3) Even so, in about 26 years time

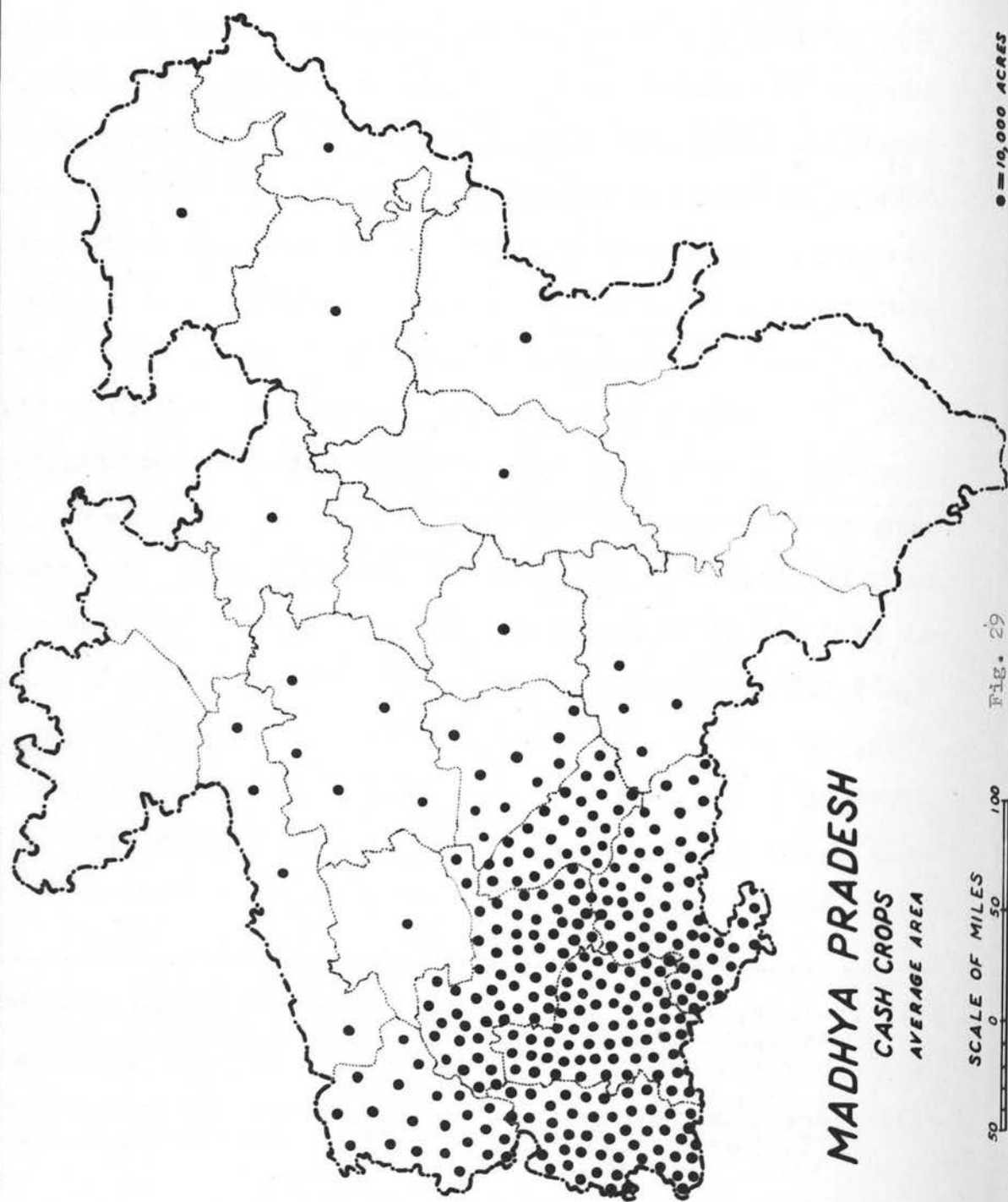
only 3,033 villages were consolidated on a voluntary basis in

this State. The total number of villages in Madhya Pradesh is

(1) Beuer, P.T. and Yamey, B.S. - The Economics of Under-Developed Countries, London 1957, p. 177 179

(2) Consolidation of Holdings, Reserve Bank of India Bulletin No. 34, Bombay 1951, p. 17

(3) Recent Developments in Certain Aspects of Indian Economy - I, International Labour Office, Delhi 1956, p. 31.



SCALE OF MILES

0 50 100

MADHYA PRADESH  
CASH CROPS  
AVERAGE AREA

Fig. 29

= 10,000 ACRES

is 48,444. (1) With this rate of progress it will take another 390 years to cover the remaining villages! Hence, it does not seem a solution to the problem. The solution probably lies in collective or cooperative farming.

Irrespective of the merits and demerits of collective farming, however, the individual ownership of land and the sentimental attachment of the people for the land for the last many centuries, will not allow their rights of property to be abolished by one stroke of the pen. A democratic government depending on universal adult suffrage cannot afford to coerce the vast majority of the people. Hence, some form of cooperative farming would seem to be the best solution to the problem.

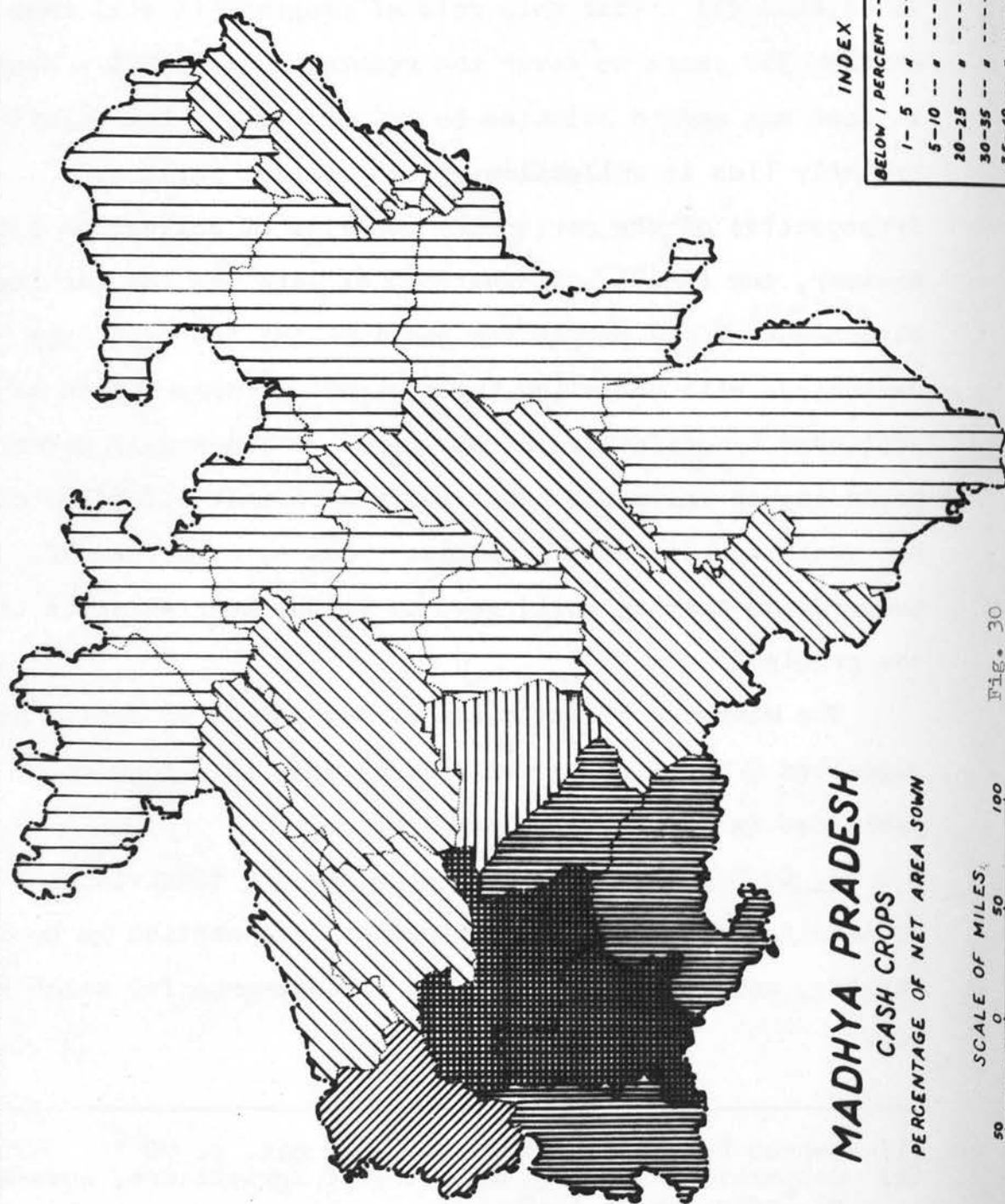
The Ministry of Agriculture, Government of India, has suggested 4 types of cooperative farming in a booklet published in 1949. (2) They are:

1. Cooperative Better Farming Society (Individual and individual operatorship ownership/~~but collective cultivation~~) cooperation in buying, selling, use of machinery, joint arrangements for watch and ward etc.

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(1) Census Report of M.P., 1951, op. cit. p. 70

(2) Cooperative Farming, Ministry of Agriculture, Government of India, Delhi 1949.



# MADHYA PRADESH

## CASH CROPS

PERCENTAGE OF NET AREA SOWN

### INDEX

BELOW 1 PERCENT	1-5	5-10	10-25	25-35	35-40
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Fig. 30



2. Cooperative Joint Farming Society (Individual ownership but collective cultivation) Cooperation in preparing the crop plan and undertaking all agricultural operations jointly.

3. Cooperative Tenant Farming Society (Collective ownership but individual operatorship). The Society is to supply agricultural requirements and to make arrangements for the sale of produce.

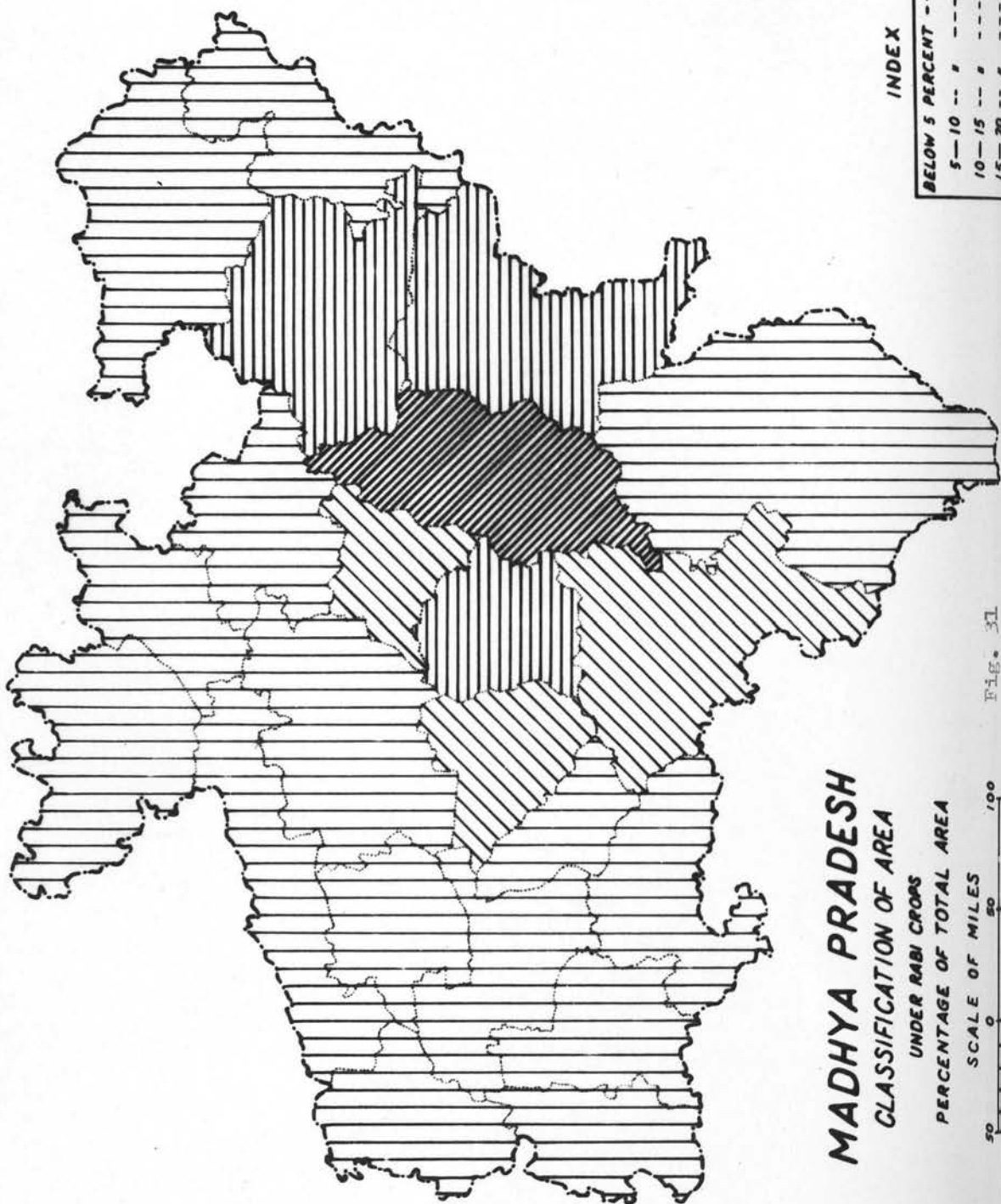
4. Cooperative Collective Farming Society (Neither individual owners nor individual workers). The cultivators are to work jointly and to get Wages proportionate to their work. At the end of the year, after deductions for expenses incurred, the profit is to be distributed to the members according to wages earned.

Which of these four is best suited for Indian conditions? The best would evolve from experiments with various methods of cooperative farming so that "by a process of trial and error a method of land use might be evolved which would suit the needs of the country. Different systems will have to be worked out under different conditions of soil and climate, and social and economic environment in order to ascertain the most suitable type." (1)

It may be noted here that there are many Agricultural Societies functioning in M.P., as is evident from the table

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(1) Cooperative Farming, Ministry of Agriculture, Government of India, Delhi 1949. p.24.



# **MADHYA PRADESH** **CLASSIFICATION OF AREA**

UNDER RABI CROPS

PERCENTAGE OF TOTAL AREA

SCALE OF MILES



INDEX

BELOW 5 PERCENT

5-10

10-15

15-20

Fig. 31

given below. But they are insufficient and moribund and need new vigour and rejuvenation.

Table No. 18. Showing Agricultural Societies in M.P. in 1948 - 49. (1)

<u>Society</u>	<u>No. of Societies</u>	<u>No. of Members</u>
1. Credit	6,556	98,632
2. Purchase and Sale	820	101,497
3. Production	17	583
4. Production and Sale	3	217
	<u>7,396</u>	<u>200,929</u>

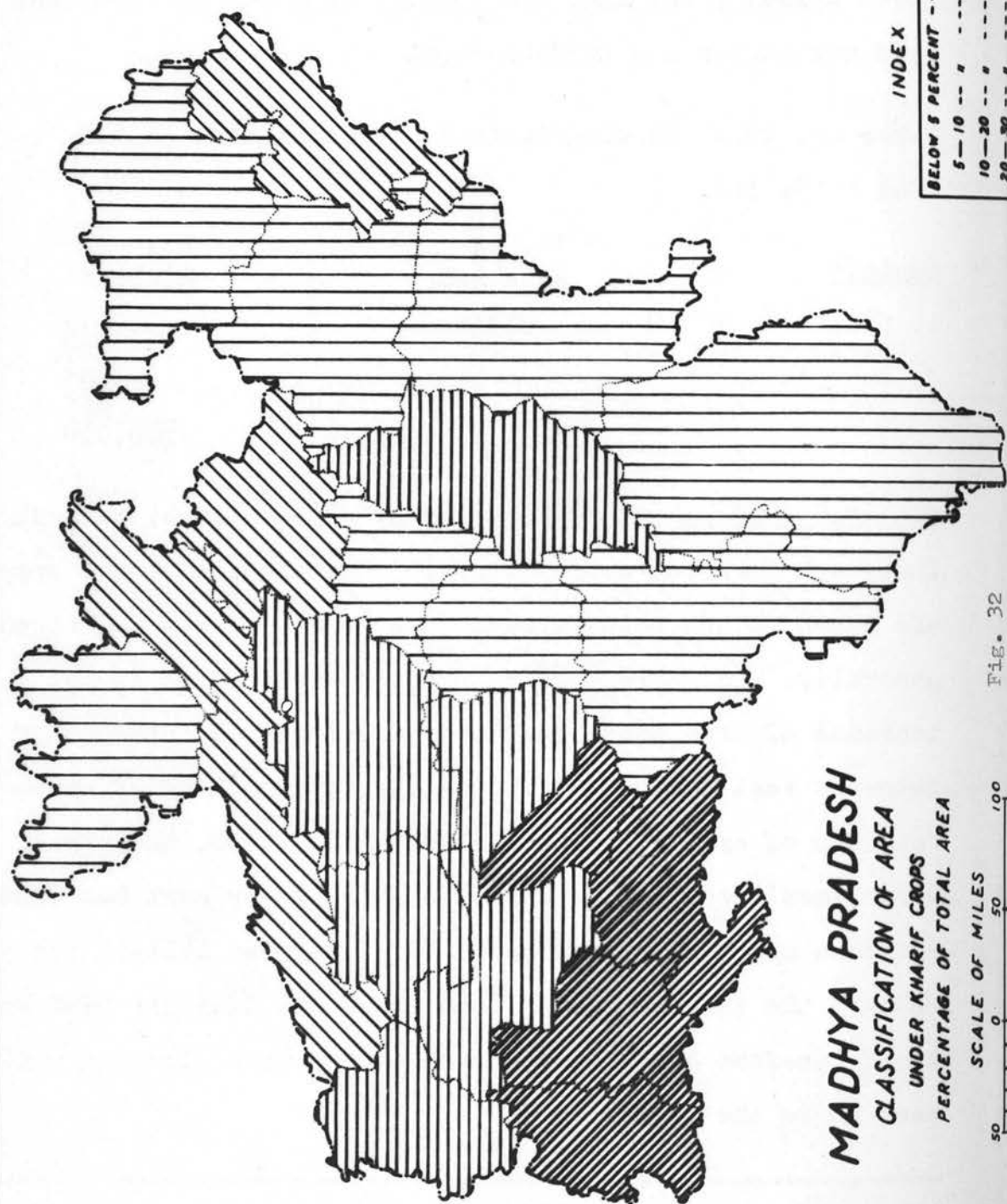
5. Old Techniques and implements. The cultural methods in India are far from satisfactory. Rotation and mixed cropping are known to the cultivators. But they are not practised generally. The pressure on land, poverty of peasants, increase of area under certain cash crops, and absence of relevant facilities are responsible for the lack of proper rotation of crops. Between 1892 and 1919-20, the area under food crops in India increased by 7 per cent but under non-food crops by 43 per cent. (2) Between 1914-15 and 1934-35 the increase under food crops was 12.4 per cent and under non-food crops 54 per cent. (3) Crop planning would seem to be the remedy.

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(1) Report on the Working of the Cooperative Societies in the C.P. and Berar for the Period from 1st July 1947 to 30th June 1949, Nagpur 1951, pp. 60 and 61.

(2) Wadia, P.A. & Joshi, G.N. Wealth of India. London 1925, p.37.

(3) Mukerjee, R. <sup>Food</sup> Planning for Four Hundred Millions, London 1938, p. 16.



**MADHYA PRADESH**  
**CLASSIFICATION OF AREA**  
**UNDER KHARIF CROPS**  
**PERCENTAGE OF TOTAL AREA**

SCALE OF MILES  
 50 0 50 100

INDEX

BELOW 5 PERCENT	5-10	10-20	20-30
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The implements used in India are of a primitive type. Should they be improved, or simply be abandoned in favour of mechanisation? From the employment point of view, mechanisation will aggravate the situation rather than solve it. The Central Food Minister said in the Indian Parliament on the 10th of May, 1956, that farming "would be carried on with cattle power and not by mechanised method, as they had to look at the problem from the point of view of employment potential".(1) Not only unemployment will increase (unless alternative employment is provided) but cultivators will lose their secondary and tertiary income. The "cultivators generally use the same bullocks in the carts which they employ for cultivation purposes .... Farm produce is also transported on the back of the animals from villages .... (cattle are) also used for driving sugar cane crushers and oil ghanis. A large number of ghani owners are also cultivators and some of them employ their cattle for both the purposes." (2) The Royal Commission on Agriculture remarked that these implements "are, on the whole, well adapted to local conditions. They are within the capacity of the draught oxen, comparatively inexpensive, light and portable, easily made and, what is perhaps of even greater importance, easily repaired and they are constructed of materials which can be readily obtained." (3) Of course, there is the

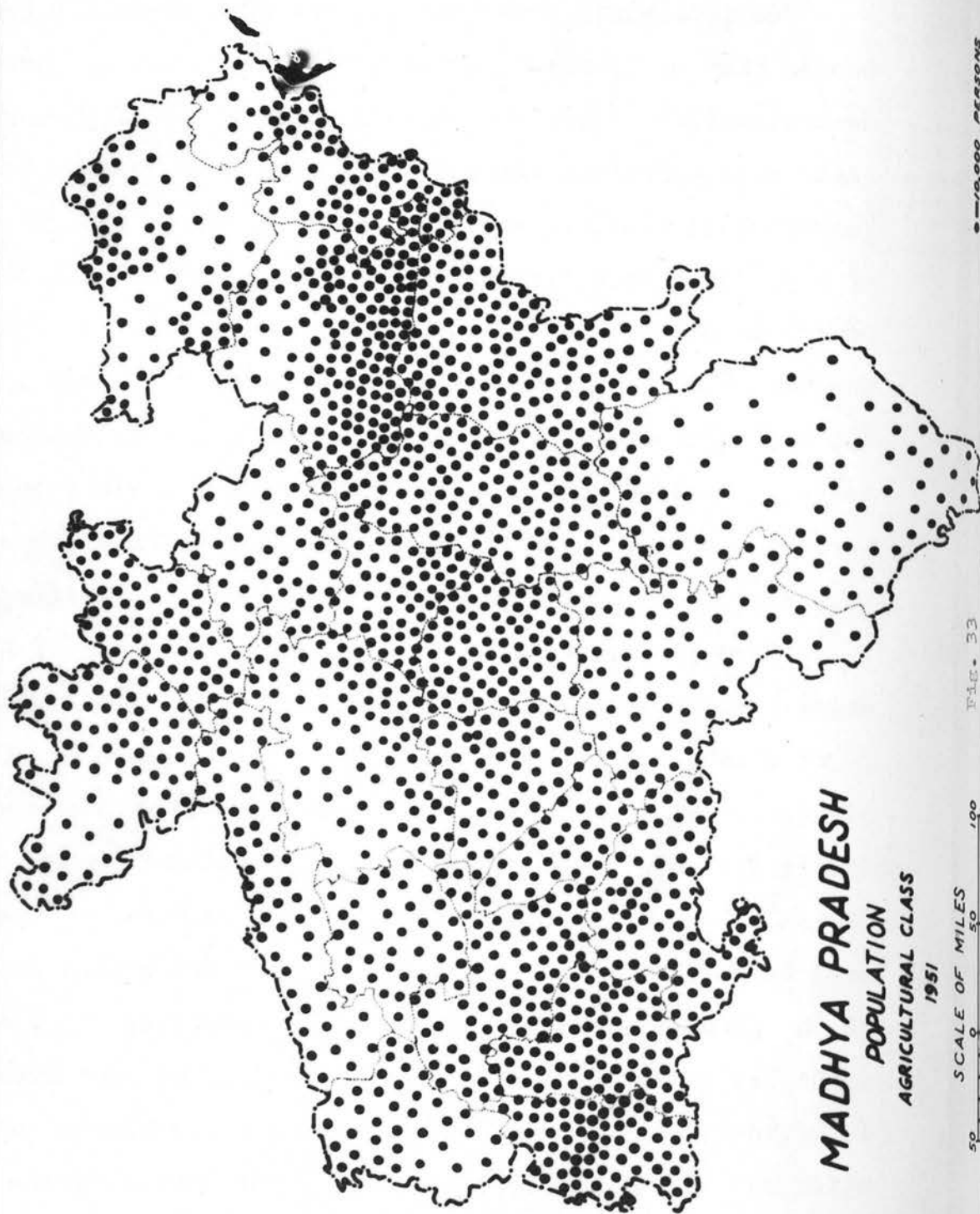
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(1) India News, India House, London, May 19, 1956.

(2) Report on the Marketing of Cattle in India, Govt. of India, Bombay 1956, p.22.

(3) Royal Agricultural Commission, op.cit., p.107.







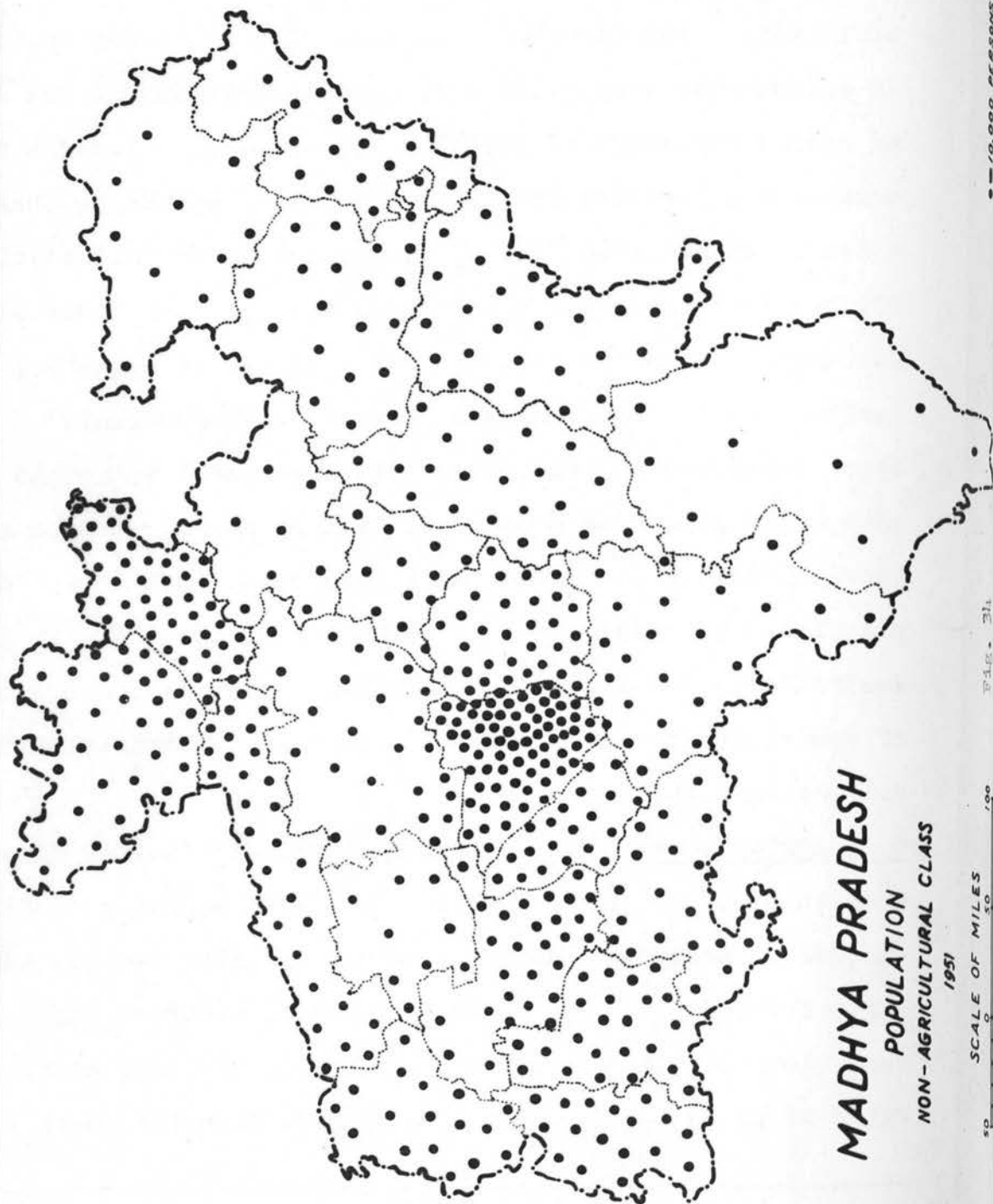
necessity to improve indigenous implements and make them more efficient. The Commission is also of the opinion that "there is undoubtedly very great scope for improvement in the light of modern knowledge of soil conditions". (1) Besides the high cost of tractors and machineries and tiny holdings, there is a dearth of mechanics and operators and inadequate facilities for proper service and spare parts." There were numerous instances", said the central Food Minister at a meeting of tractor dealers, manufacturers and State Governments' representatives in 1950, "when tractors purchased could not be used after some time because of lack of proper service and spare parts." (2) Though wholesale mechanisation is not plausible at present, yet in certain limited sphere it is desirable to use tractors, harvesters, etc. - for eridication of weed-infested land and reclamation and colonization of culturable wasteland.

6. Agricultural Labour. The agricultural "labour is scattered, unorganised, ill paid, ignorant, and very scantily nourished, clothed or housed. There is no organisation amongst them to fight for and safeguard their interests, secure decent conditions of work and living, including housing, hours of work, rates of wages, and a measure of social security which the

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(1) Royal Agricultural Commission, op. cit., p.107.

(2) Towards Land Transformation, Part I, op.cit., p.42.



# MADHYA PRADESH

POPULATION  
NON-AGRICULTURAL CLASS

1951

SCALE OF MILES

0 50 100

FILE 311

• = 10,000 PERSONS

industrial worker is now steadily attaining. The seasonal character of the occupation militates against any immediate improvement unless and until an all-round national policy concerning landholding and cultivation is adopted and carried into effect." (1) The magnitude of the problem can be gauged from the fact that an intensive survey of M.P. agricultural labour made in 1955 revealed that "86% of the families were of agriculturists and 14% of non-agriculturist. About 40% of the families belonged to agricultural workers. Of these, about 37% had some land while 63% were landless". (2) In 1951, the Government of India Ministry of Labour made an enquiry into the conditions of agricultural labour in Village Khapri (District Nagpur) and found that most of the labour suffered deficit budgeting. (3) In M.P., agricultural labour is a serious problem as is evident from the table given below.(4)

Table No. 19. Showing percentage of agricultural labour in rural population in M.P.

Density of Population	Percentage of rural to total population	Percentage of agricultural labour in rural population		
		Total	With Land	Without Land
163	86.5	40.1	14.9	25.2

- (1) National Planning Committee Series (Report of the Subcommittee) Land Policy, Agricultural Labour and Insurance, Bombay 1948, p.175.  
 (2) Report on Intensive Survey of Agricultural Labour, Vol.VI, Central India, Delhi 1955, p.12.  
 (3) Report on an Enquiry into the Conditions (contd. next page)

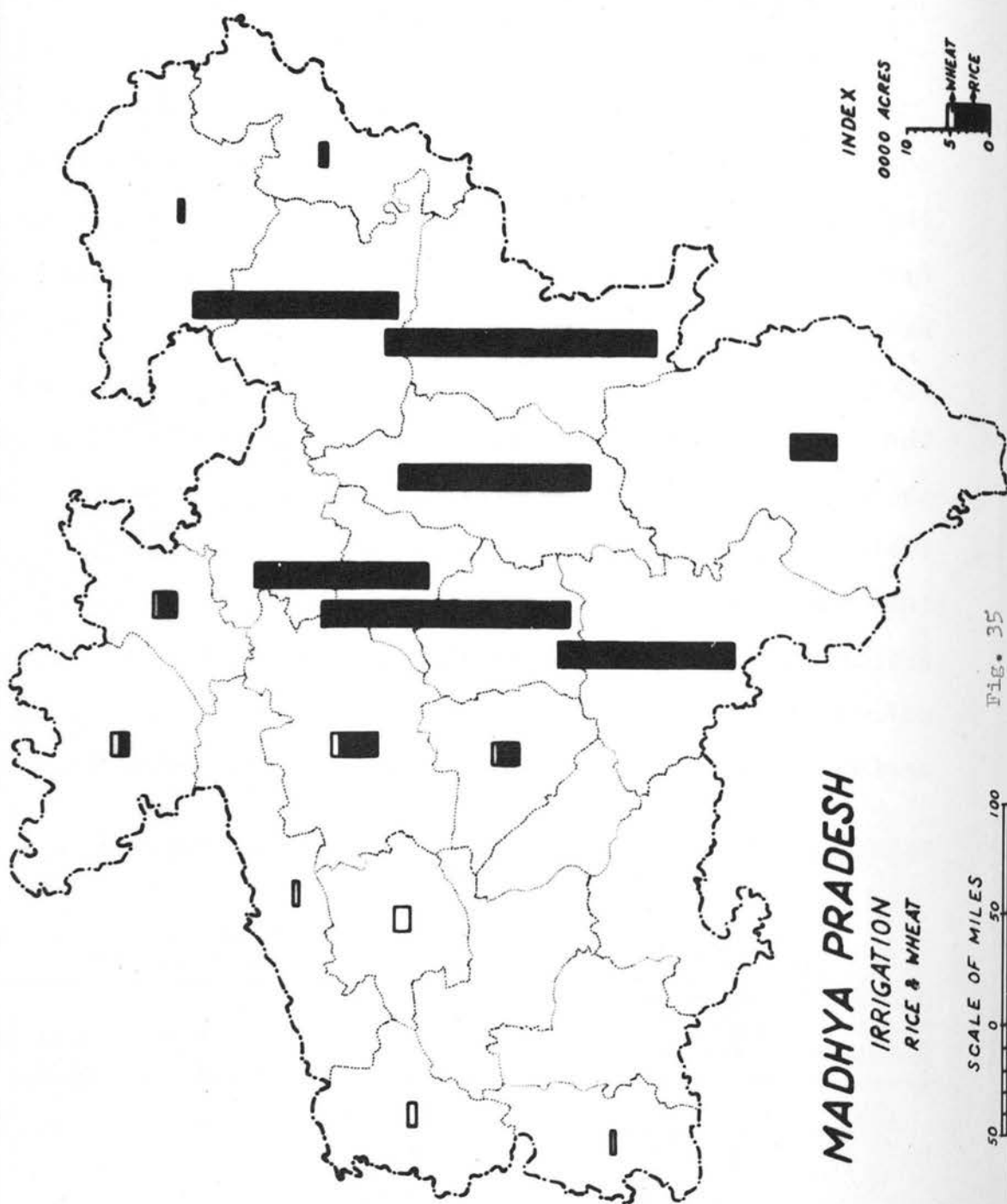


Fig. 35

The subsidiary occupations for them are 'bidi' making, and collection of minor forest produce, viz., tendu leave, lac, gum, grass, fuel, etc. (1) Agricultural labour does not remain employed for the whole of the year as is evident from the table below. (2)

Table No. 20. Showing average days of unemployment of adult male workers in different agricultural zones of M.P.

<u>Zone</u>	<u>Average days of unemployment</u>
Cotton	55
Wheat	62
Rice	47

In 1955, every agricultural labourer's family was earning on an average Rs.390/- (£29.5s.) per annum and expending Rs.414/- (£31.1s.) annually, "leaving a deficit in the family budget". (3) On an average about 99% was spent by every family on food, clothing, footwear, services and miscellaneous - 89.3% on food, 5.4% on clothing and footwear, and 4.4% on services and miscellaneous. (4) The consequence is that they

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(contd.) of Agricultural Workers in Village Khapri (District Nagpur) in M.P. State, Govt. of India Ministry of Labour, Delhi 1951, pp.12 and 15.

(4) Second Five Year Plan, op.cit., p.314.

(1) Report on Intensive Survey of Agricultural Labour, Vol.VI, Central India, op.cit., 14.

(2) Ibid, p.16.

(3) Report on Intensive Survey of Agricultural Labour, Vol.VI, Central India, op.cit., p.22.

(4) Ibid, pp.25 and 26.

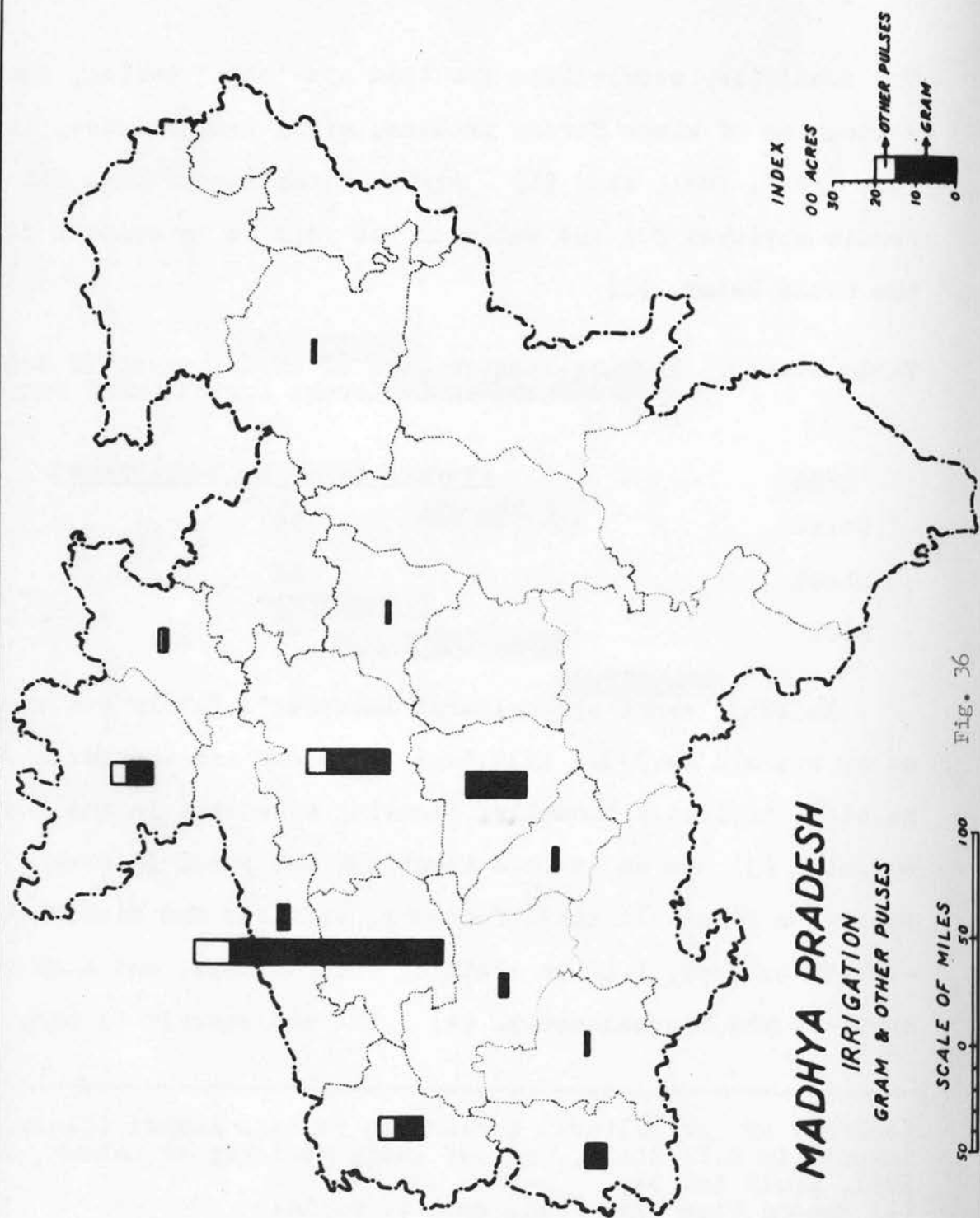


Fig. 36



remain perpetually under debt to the village money-lenders.

Conscious of the importance of agriculture, "the First Five Year Plan made a provision for programmes relating to agricultural production, land reforms, cooperation and village industries, which may be expected to help agricultural workers in obtaining additional employment". (1) In the first plan a programme was made for resettlement of landless labourers. It is proposed to continue this in the second plan.(2) During the first plan, minimum wages were fixed in some of the states - though not in Madhya Pradesh. But "under existing conditions pressure of population on land and abundance of the supply of labour, enforcement of minimum wages presents difficult problems". (3) "The low level of living", says the Government of India Planning Commission, "is due not so much to a low wage, as to lack of sufficient employment opportunities"(4). Hence, greater opportunities are to be created for greater employment. The important recommendation under the second plan is the creation of Boards in the states to advise on schemes for the rehabilitation of landless workers, Taluka (Subdivision) Cooperative Union and village labour Cooperative

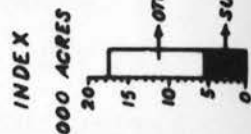
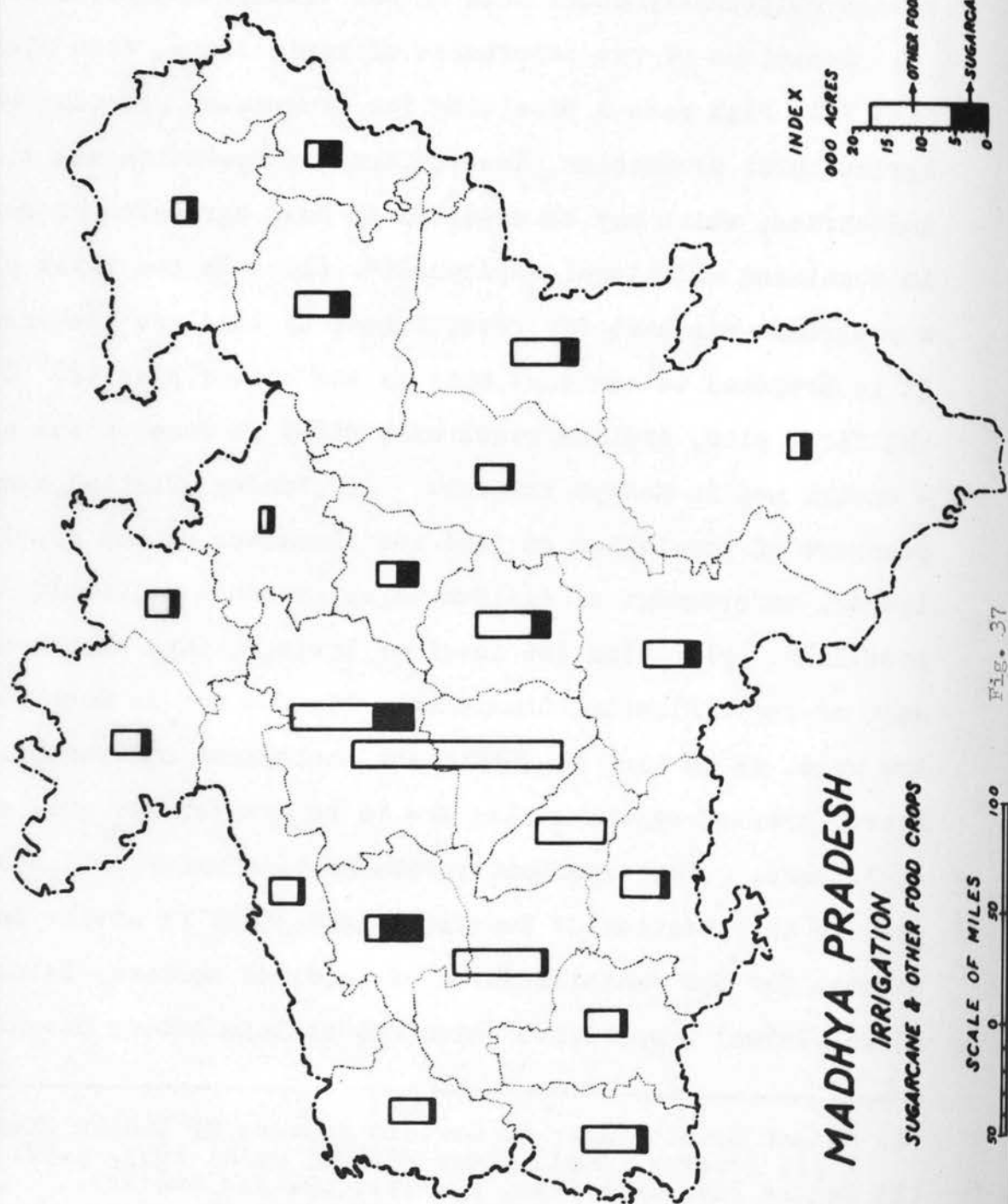
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(1) Recent Developments in Certain Aspects of Indian Economy - II, International Labour Office, Delhi 1955, p.57.

(2) Second Five Year Plan, op.cit., pp. 318 and 319.

(3) Ibid, p.320.

(4) Ibid, p.584.



**MADHYA PRADESH**  
**IRRIGATION**  
**SUGARCANE & OTHER FOOD CROPS**



Fig. 37

Societies. These unions and societies should provide a labour force for constructional works to be undertaken during the second plan. (1)

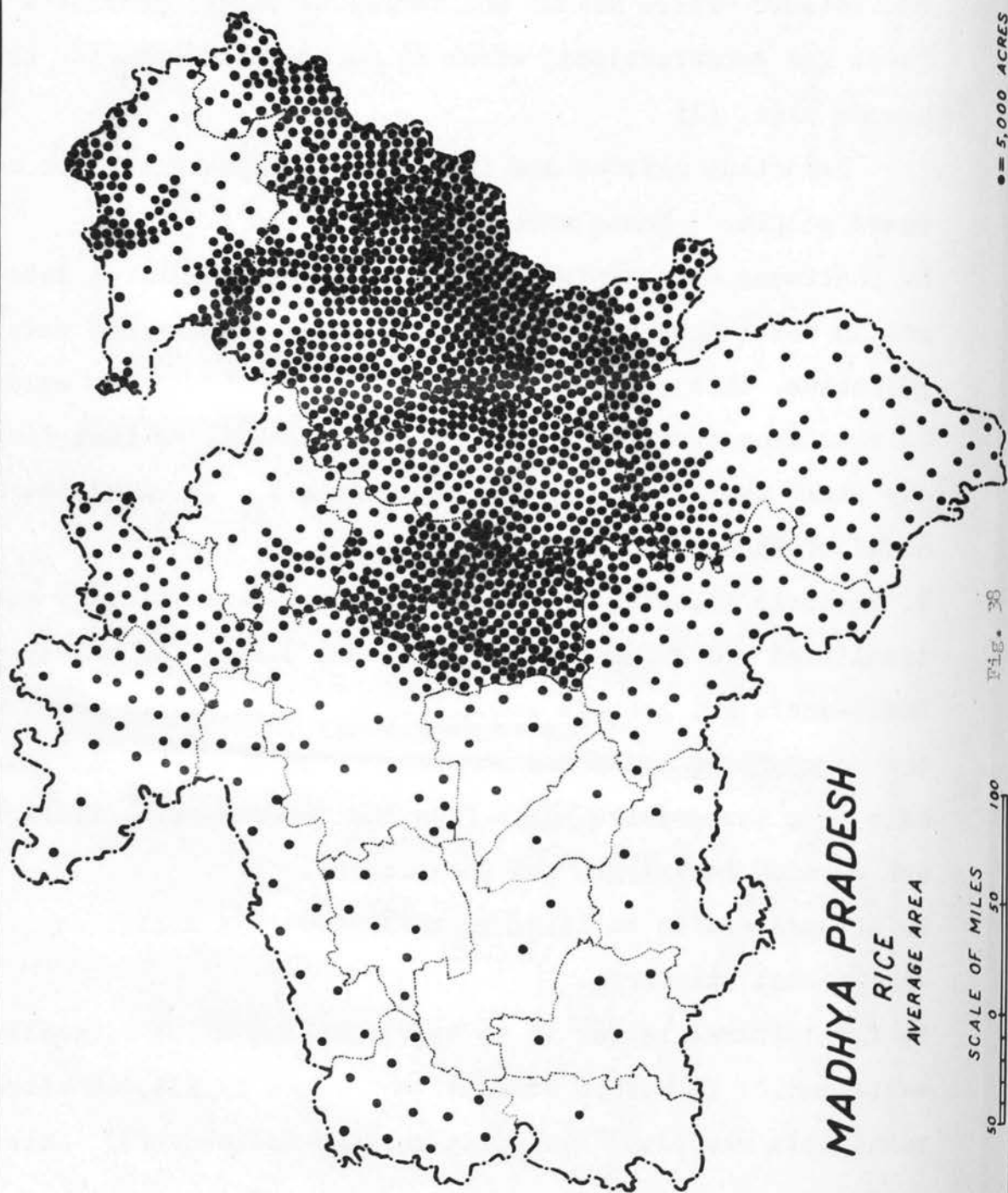
Important reforms are indicated to improve the lot of these people. These are:-

1. Enactment of a minimum wages law for agricultural labour in states which have not yet any such law. Though not very effective, this certainly will improve some economic conditions.
2. Enactment of a law to liquidate old debts, so that families may start their lives with <sup>a</sup> clean/slate. It should be on the model of Encumbered Estate Act.
3. Economic planning to provide secondary and tertiary means of livelihood and offer sources of income during the off-season. Small-scale and cottage industries and handicrafts are some of the occupations which can be taught with a little financial help on a cooperative basis from the Government. Villages can set up such industries and occupations.
4. Schemes are to be launched to improve the social and educational standards.
5. Agricultural labour is to be rehabilitated on agricultural wasteland. In Madhya Pradesh, there are 13,834,000 acres of cultivable wasteland excluding current fallows. (2) This land

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(1) Second Five Year Plan, op. cit., p.319.

(2) Raychurdhri, S.P.: Reclamation of Wasteland, Indian Farming, Vol.XI No.9, September 1950, Delhi.p.390.



could be put under plough, if a proper reclamation scheme were launched. This proposition will not only solve to a certain extent the labour problem, but will also help to increase agricultural production.

Agricultural Production in M.P. (Fig. 26, 29, 30, 53, 54, 66-71). Owing to its central position in the subcontinent, this state grows almost every crop which can be grown in India. The main crops of the state are rice, wheat, jowar, Kodon and Kutki (small millets), pulses, oilseeds and cotton.

Out of the total area of 83,104,748 acres of the state, the average net cropped area is 28,353,091 acres - only 34.1% (Fig.26). Only 10.9% is sown more than once (Fig.70 and 71). The average percentage of various crops to net cropped land is 88.4% foodgrains (Fig.66 and 67), 9.9% oilseeds (Fig.53,54), 10.9% cash crops (Fig.29,30) and 3.1% other crops (Fig.68,69). Of the average total area sown, 78.8% is under foodgrains, 8.8% under oilseeds, 9.7% under cash crops and 2.7% under other crops.

Foodgrains (Fig.27, 35-52). The important food grains raised in the state are rice, wheat, jowar and other millets and Kodon and Kutki (small millets).

1. Rice. Of the three staple crops of the state (rice, jowar and wheat) rice is the most important. Madhya Pradesh was fourth among Indian states with 12.0% of the all-India acreage of rice and 11.2% of production. (1) Rice is the most

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(1) Estimates of Area and Production of Principal Crops in India (contd. next page)



important crop of the state with the largest acreage in any crop - 30.8% of the net average cropped area (Fig.38 and 39)(1). Out of the average total cropped area of 28,353,091 acres, rice occupies an average area of 8,736,921 acres.

In M.P. the soils on which rice is cultivated are brown heavy loams and red and brown sandy and medium loams. The brown heavy loams are found in Wainganga Valley and red brown sandy and medium loams in the higher parts of the Wainganga Valley on the high-lying eastern plateau, N.E. of the State and on high lying tracts of Chhattisgarh. The rainfall in these areas is generally between 50 and 55 inches per annum. The above are the soil and rainfall conditions of the main rice zone. But it is grown in all the districts of the State, i.e., in a variety of soils and within a considerable range of temperature and rainfall.

There are two systems of sowing - broadcast and transplanted. In M.P. it is mainly broadcast, accounting for 81.7% of the total acreage under rice (2). Only 18.3% is transplanted. The three districts of Bhandara (40%), Balaghat (28%) and Chanda (16%) contribute together 84% of the total transplanted area (3). The present trend is an increase in

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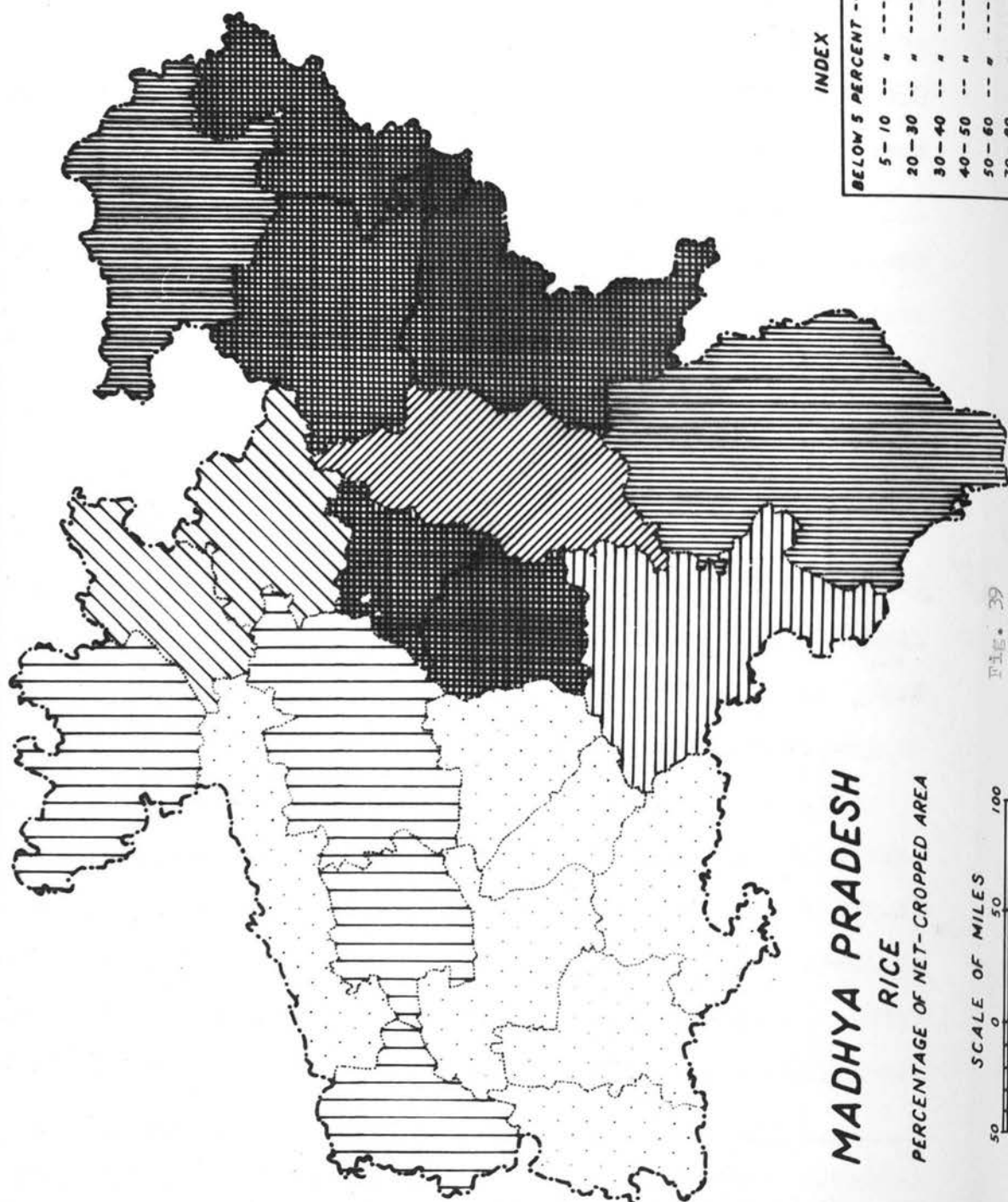
(contd.) 1952-53, Vol.II (Detailed Tables), Ministry of Food and Agriculture, Delhi 1955, p.vii.

(1) Indian Agricultural Statistics, 1949-50, Vol.II (Detailed Tables), Delhi 1955, pp.248 and 253.

(2) Report on Marketing of Agricultural Commodities, No.4.Rice, Nagpur 1952, p.3.

(3) Ibid, p.3.





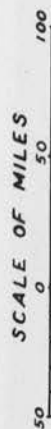
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BELOW 5 PERCENT	5-10	10-20	20-30	30-40	40-50	50-60	70-80
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# MADHYA PRADESH

## RICE

PERCENTAGE OF NET-CROPPED AREA



transplanted area. In 1909-10, it was 17.2%, which increased during the quadrennium ending 1949-50 to 19.2 per cent. (1)

In M.P. only the autumn<sup>\*</sup> crop of rice is grown. In M.P. water to rice field is supplied mainly by the rain (which comes mainly during the summer months) and by natural flood by bunding (walling the fields) the fields. Wherever the facilities are available (such as in E.M.P. which is the main rice growing area of the State) by tanks (in E.M.P. are the highest number of tanks in the whole of the State). But in tanks sufficient water is not available in other seasons and also there is little rainfall except during rainy season. It may be mentioned here that in the State 77% of rice cultivation depends on rains. In the broadcast method the seed is broadcast in June either before the rain or after the break of the monsoon. Generally the medium and coarse varieties are sown broadcast. In transplantation, sowing is done in nurseries during the third week of June. After about four to six weeks, the seedlings are transplanted to the rice fields. The harvesting period is from the middle of October till the end of December.

Three types of rice are grown in the state - early, medium and late, depending upon the length of the growing time.

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(1) Ibid, p.3.

\* The autumn crop is any crop harvested between October and December, including early and late maturing varieties.

All are sown at the same time. It is not possible to give actual area under different types as data are not available.(1) But "it is estimated that about 30 per cent of the area is under early maturing varieties, 50 per cent under medium ones and the remaining 20 per cent under late maturing varieties". (2)

There are three qualities of rice grown in the State - fine, medium and coarse. No data regarding the areas under these varieties are available, "but it is estimated that about 7 per cent is under fine varieties, 35 per cent under medium and the remaining 58 per cent under coarse one" (3). The fine and medium varieties are mainly grown in the districts of Balaghat, Bhandara, Bilaspur, Chanda, Durg and Raipur, along with coarse varieties. In other districts generally coarse varieties are grown. (4)

There has been a steady increase in area under rice cultivation during the present century. In 1909, the area under rice was 4.84 million acres, which increased to 8.94 million acres in 1949-50 and to 9.02 million acres in 1951-52 (5).

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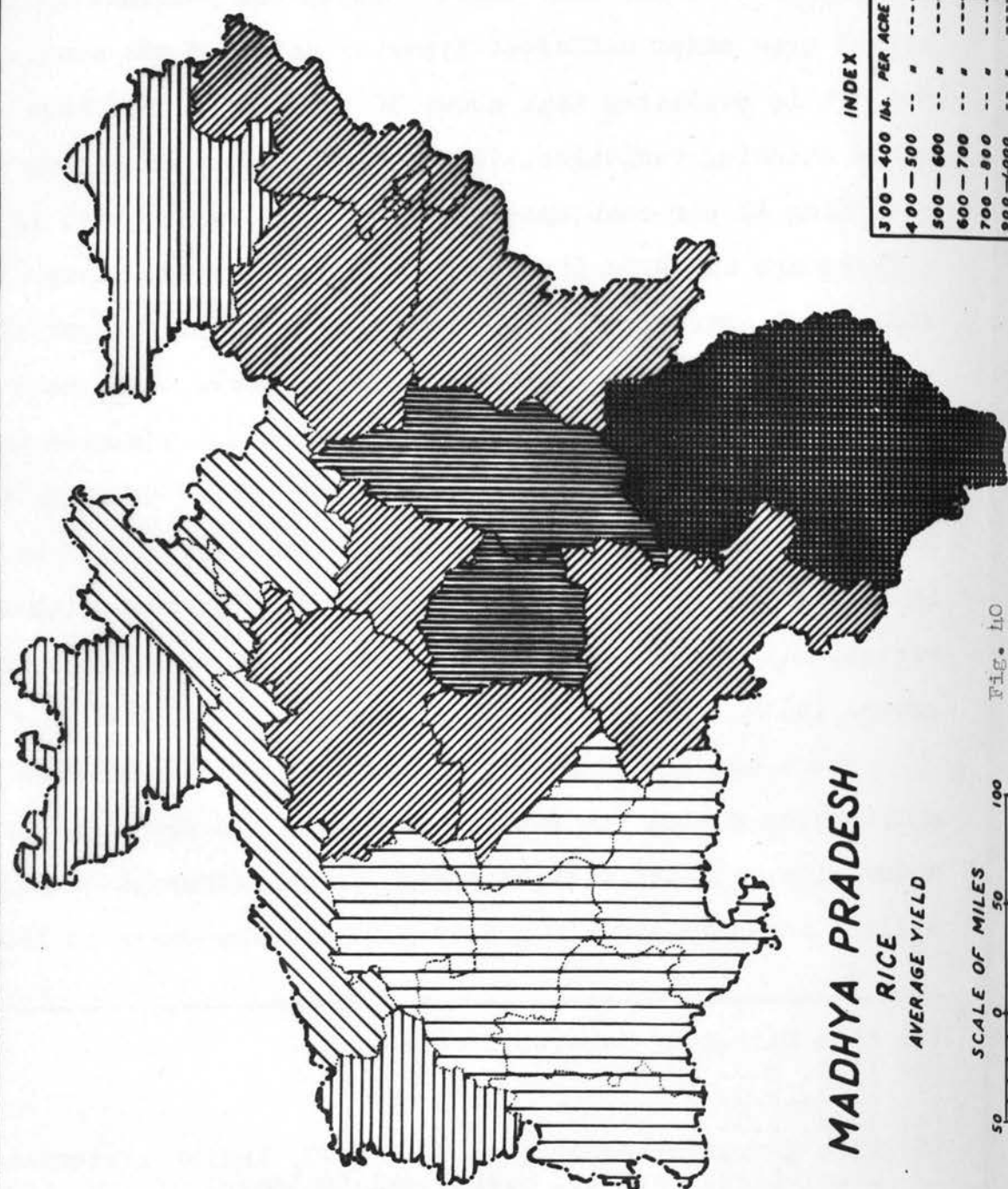
(1) Rice Marketing Report, op.cit., p.3.

(2) Ibid, p.3.

(3) Ibid, p.3.

(4) Ibid, p.3.

(5) Rice Marketing Report, op.cit., p.2, Indian Agricultural Statistics, op.cit., p.248, and Estimates of Area and Production, op.cit., p.112.



In 42 years the area has increased by about 86%. Prior to the World War II, the expansion was due to changes in the State boundaries as well as to increasing demand of rice, not only within the State itself but also within the neighbouring States. Since 1943-44, the increase has been mainly due to the "Grow More Food Campaign". The average area under rice for three years ending 1949-50 was 8,736,921 acres. Though grown in all districts, the main growing districts are Balaghat, Bastar, Bhandara, Bilaspur, Chanda, Durg, Raigarh, Raipur and Surguja. These nine districts together contribute on the average 88.6% of the rice area of the State (7.7 million acres out of 8.7 million acres).

Only 23% of the area under rice is irrigated (Fig.35). The late and medium varieties require irrigation, the early varieties generally depend upon rains. In 1952 the area under irrigated rice was 1.63 million acres.(1)

The yield of rice depends on weather conditions, type of rice and methods of growing. In M.P. 77% of rice cultivation depends on rains. Hence, it depends on the vagaries of nature. For a good yield there should be a timely break of the monsoon and well distributed rainfall during the growing period. A break of a fortnight during the growing period is essential for a heavy soil, otherwise water-logging damages

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(1) Tables of Agricultural Statistics for the year ending the 31st May, 1952, Nagpur, 1955, p.5.



the crop. On the other hand such a break in the light soil may check the tillering of the plant and affect the yield adversely. At flowering time, showers are harmful. If there is rain at harvest time it lessens the quality of the grain. Yields of late types are higher than of early or medium ones and coarse varieties give higher yield than fine. Yield also depends on method of growing. Broadcast crops yield less than transplanted ones. Similarly, the outturn of irrigated crop is greater than of rain-fed ones. The estimated average yield per acre during the quinquennium ending 1952-53 was only 585 lbs. and is fifth among the Indian States (Fig.40) (1). Not only is the average yield low, but there is a gradual decrease in yield per acre as is shown in the table below. (2)

<u>Year</u>	<u>Average yield per acre (in lbs.)</u>
Quinquennium ending 1938-39	660
" " 1945-46	605
" " 1952-53	585

The reason for this low yield and gradual deterioration of the crop are the gradual loss of fertility, the absence or paucity of fertilizers and manures, the large area under

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(1) Estimates of Area and Production, op.cit., p.51.

(2) Rice Marketing Report, op.cit., p.6.



broadcast and the lack of irrigation. The yield can be increased by irrigation, use of green manuring, use of fertilizers, better practices in sowing, and sowing at the optimum time. Irrigation increases the yield by 40 p.c. (1) Next to irrigation, cattle dung and green manure are very effective. Nitrogenous and phosphatic fertilizers, in the ratio of 1:1, give good results. It has also been proved by 15 years experience that a "transplanted crop gives 34 per cent higher yield than biasi (broadcast)" (2). If sowing is done at optimum time, it gives greater yield (3). But this postulates irrigation. To control water hyacinth, a very troublesome weed in paddy, two spraying with dimethyl chlorophynoxy acetic acid in the ratio of 29 ounces in 150 gallons of water should be given. (4) The average estimated production of rice in the State during the quinquennium ending 1952-53 was 2,329,600 tons. (5)

The secondary products of paddy are "brokens", rice bran and husk. These are obtained when paddy is converted into

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- (1) Dave, B.B.: Per-acre yield in M.P. can certainly be raised, Indian Farming, Vol.VI, No.8, November 1956, Delhi, p.75.
  - (2) Ibid, p.75.
  - (3) Chandnani, J.J.: Some Practical Hints on how to Grow More Paddy, Indian Farming, Vol.II, No.1, April 1952, Delhi, p.8.
  - (4) Ibid, p.29.
  - (5) Estimates of Area and Production of Principal Crops in India 1953-54, Vol. II, Delhi 1956, p.7.

rice. The brokeners are mixed up in varying proportion with rice. Rice bran is given to cattle as it is a very nutritive cattle feed. It is also exported to other States. Husk is used in boilers in the power mills and in pottery, brick and tile manufacturing kilns.

Madhya Pradesh being a surplus area in rice production is an exporter of rice. There have been fluctuations in the quantity of rice exported to other States, depending upon the production of rice and other staple food crops in the state and the price of rice and demand. During the quinquennium ending 1945-46, this State exported annually on an average 117 thousand tons and in the quadrennium ending 1949-50, 105 thousand tons. (1)

The rice tracts in Madhya Pradesh are served by five Governmental Farms. They have different types of soil, ranging from light sandy loam to heavy black soils. The objects of these stations are (1) to select or hybridise higher varieties suitable for the main rice tracts of the State - Chhattisgarh, Wainganga Valley and North of the State, (2) to evolve new strains, and (3) to find out suitable manurial schedules for rice cultivation. These Experimental

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(1) Rice Marketing Report, Op.cit. p.88.

(1) Sathi, R.L. (Revised by Kamiah, K. and Abraham, T.P.) - Manuring of Rice in India, The Indian Council of Agricultural Research Bulletin No.38, Calcutta 1952, p.94.

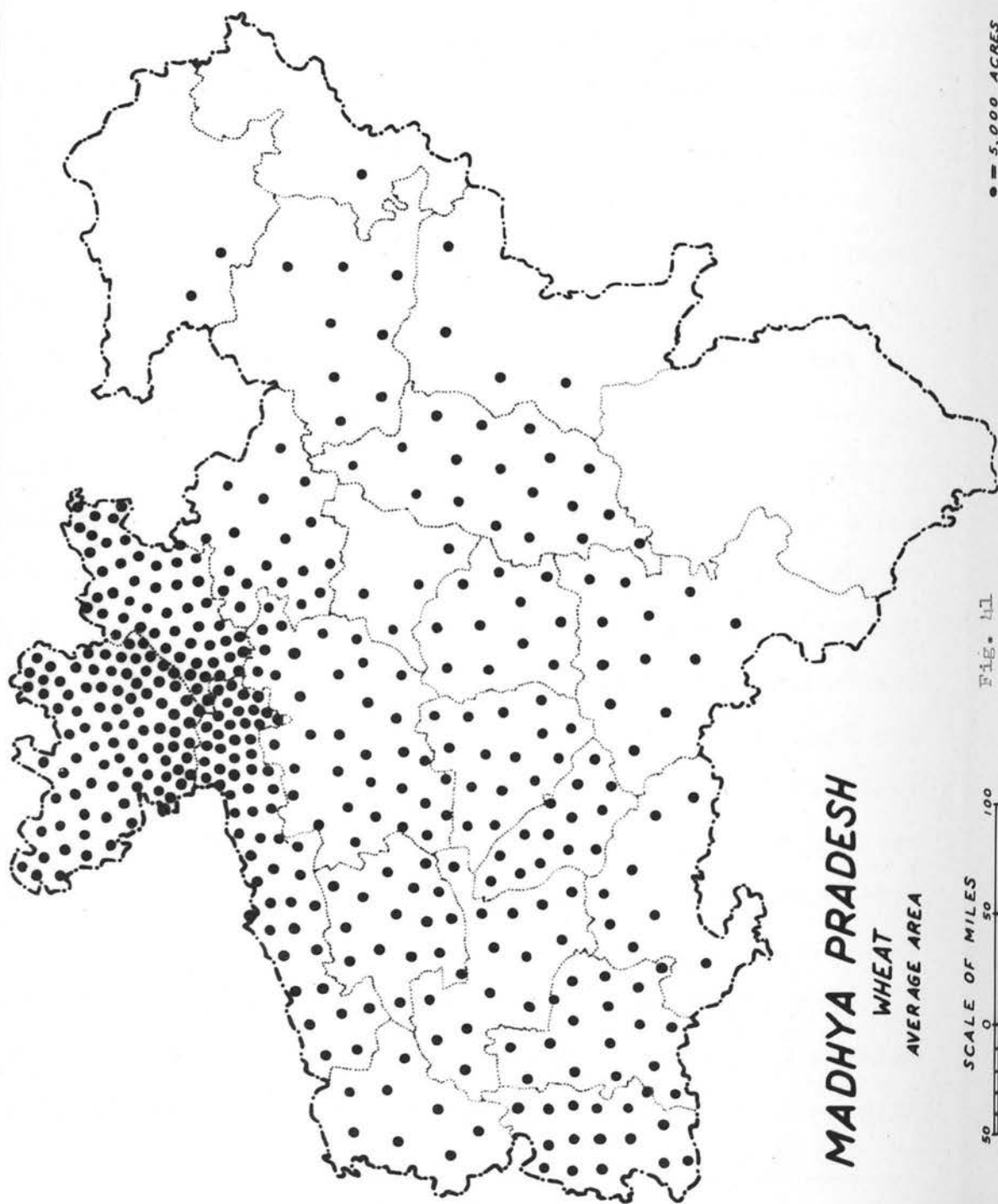
(2) Rice Marketing Report, op.cit., p.4.

(3) Ibid, p.4.

Farms have done creditable work in all the branches of research assigned to them. They have evolved new strains and with judicious application of manures have increased the yield. But it should be noted that the results obtained were under optimum conditions and not under conditions on the average peasant holding. "The experimental stations", Sethi says, "have been too few and the conditions vary enormously in a tract. As suggested by Dr. A.B. Stewart in his report there is great need for more experiments, both simple and complex under cultivation and a simultaneous study of the soil so that the experimental results can be correlated with soil conditions." (1) Within the range of the three main types (early, medium and late), "there are more than a thousand varieties being grown all over the State". (2) Of these, 700 different varieties have been isolated by the Rice Research Station, Raipur, and 20 of them "are found to be definitely superior in yield to the ordinary varieties". (3) The area under improved strain is increasing gradually.

The output of rice can be increased without bringing more acreage under rice. Some suggestions for increasing output without increasing the acreage are (1) full utilization of

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- (1) Sethi, R.L. (Revised by Ramiah, K. and Abraham, T.P.) - Manuring of Rice in India, The Indian Council of Agricultural Research Bulletin No.38, Calcutta 1952, p.94.  
 (2) Rice Marketing Report, op.cit., p.4.  
 (3) Ibid, p.4.



**MADHYA PRADESH**  
**WHEAT**  
**AVERAGE AREA**

SCALE OF MILES  
0 50 100

Fig. 41

● = 5,000 ACRES

tracts of India. According to the "Ayeen Akbari" (a history existing irrigation facilities, (2) new irrigation projects completed, to be made use of it, (3) more use of manures and fertilizers, (4) use of improved varieties of seeds, (5) more area to be put under transplantation, and (6) late maturing type to be encouraged where irrigation facilities are available.

Double cropping is practised in a considerable part of the rice area. It is done with crops like linseed, urid and teora (pulses). Teora is the least paying under normal conditions. It should be replaced by linseed. Soya bean is to be tried as a second crop after paddy.

2. Wheat. India produces about 3.5 p.c. of the total world production of wheat. Madhya Pradesh, with 11.2% of the all-India acreage and 8.1 p.c. of the production, was third in 1952-53 among the Indian States. (1) In acreage it is the third important staple crop in the state - rice being the first and jowar second (Fig. 41). If non-food crops are also included, its position goes down to fourth - third being cotton. But as a staple crop it is second in importance. It occupies 7.3% of the average total net cropped area of the State (2,078,168 acres out of 28,353,091 acres) (Fig. 41 and 42).

The Narmada Valley possesses one of the richest wheat

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(1) Report on Marketing of Agricultural Commodities, No. 1.

(1) Estimates of Area and Production, op.cit., pp. VIII and IX.



tracts of India. According to the "Ayeen Akbari" (a history of the reign of Akbar), Upper Narmada Valley used to export wheat to Gujrat and Deccan (1). It is said "that during the 19th century the province used to export nearly 37,000 tons of wheat ... and this formed the major item of business of millions of people of the province" (2). But the present is a different story. There has been a wide fluctuation in area during the last 60 or 70 years and the trend on the whole is downward.

In this State wheat is raised on the heavy black soil, covering the Narmada Valley and the open and level portions of the Satpura and Vindhyan plateaus. The soil formation is due either to the deposition of decayed vegetable matter brought by rivers and streams or to the decomposition of trap or basalt rock, or to the combination of both agents. To be more precise, there are two types of soil in M.P. on which wheat is grown - heavy clay to medium loams and heavy clay loams. The heavy clay to medium loams are found on the plateau and the western areas north of the Narmada with a rainfall of 36" to 50". On this soil wheat and other rabi (winter) crops, with cotton and jowar as subordinate crops,

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- (1) Report on Marketing of Agricultural Commodities, No.1. Wheat, Nagpur 1949, p.1.  
 (2) Ibid, p.1.



are cultivated. The heavy clay loam is found in the Narmada and the adjoining area with a rainfall of 44" to 60". On this soil wheat is cultivated.

The land is prepared for wheat cultivation by scarification with a paring blade, locally known as 'bakhar', once after harvest and thereafter as many times as possible during breaks in the rains. In areas, such as Narsinghpur (Jabalpur district), where rainfall is high and where a deep clay soil does not allow effective cultural operations (being very sticky when wet, and very hard when dry), the fields are embanked. Water is released from the fields about a week before sowing. This practice "is advantageous in the way that sowing conditions are controlled, weeds, particularly 'Kans', get suppressed and eradicated, ...." (1).

Being a cold weather crop, wheat is sown from the middle of October to the end of November. It is either broadcast, especially on light soil which can be frequently irrigated, or drilled by means of a wooden plough or a three-coullered indigenous seed drill. It is sown either single or mixed with other grain. Of the total area under wheat, 87.6% is sown as a single crop while the balance (12.4%) is sown as a mixture.(2)

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(1) Report on Marketing of Agricultural Commodities, No.1 Op.cit. p.4.  
 (2) Wheat Marketing Report, op.cit., p.4.

Table No.21. Showing main types, important varieties and area where sown in M.P.

Mixture is practised in the northern districts as there is seldom rotation or manuring of wheat. Growing gram with wheat "is a form of insurance against total crop failure, for should the season prove unsuitable for wheat, there is a chance that it may not be so for gram". (1) In the main wheat zone harvesting is towards the middle of March. But in Berar and Nagpur area it is harvested towards the middle of February as the climate in that area is comparatively hot and the crop ripens much earlier.

Two main types of wheat are grown in this State - 'Pissi' (*Triticum Vulgare*) and 'Gehun' (*Triticum durum* and *Triticum turgidum*). 'Pissi' occupies 38.6% of the total area of wheat in the state, while 'gehun' accounts for 61.4% (2). These two main types include many varieties. The important varieties, with the areas where they are sown, are given in the table below (3).

Since 1941-42, there has been a very heavy demand for

wheat. Hence, every type available is purchased. Therefore,

(1) Wheat Marketing Report, op. cit. p.4.

(2) Ibid, p.44.

(3) Ibid, pp. 4 and 5.

"inferior types are driving out superior ones" (2). The

(1) Wheat Marketing Report, op. cit. p.5.

(2) Ibid, p.5.

Table No.21. Showing main types, important varieties and area where sown in M.P.

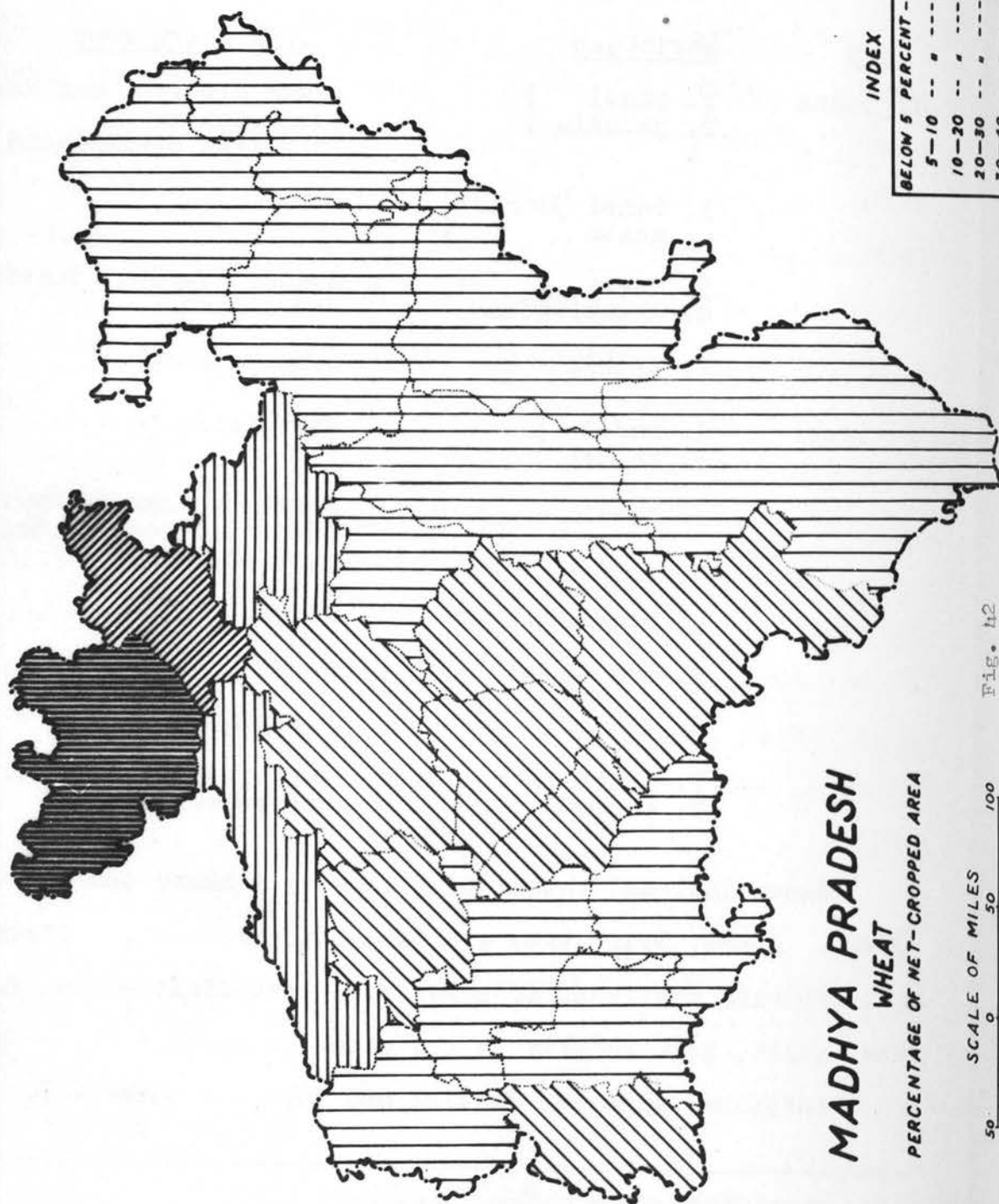
<u>Type</u>	<u>Varieties</u>	<u>Area where sown</u>
1. Gehun	1. bansi )	Nimar district and Harda subdivision (District Hoshangabad)
	2. jalalia )	
	3. bansi jaorani)	Berar
	4. ghaun )	
	5. haura )	Nagpur, Wardha, Bhandara and Chanda
	6. chawalkatha )	
	7. Kathia	Chhattisgarh
2. Pissi	1. Safed )	Everywhere
	2. Khibri )	
	3. Mundi	Jabalpur, Narsinghpur (District Hoshangabad) and part of Sagar
	4. hansasia	
	5. bot	Mandla
	6. lal	Chhattisgarh
	7. Sharbati )	Improved varieties grown everywhere.
	8. faram )	

Since 1941-42, there has been a very heavy demand for wheat. Hence, every type available is purchased. Therefore, the superior qualities of wheat "are fast disappearing from the market, particularly in the wheat tract ..." (1). Also the "inferior types are driving out superior ones" (2). The

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(1) Wheat Marketing Report, op. cit. p.5.

(2) Ibid, p.5.



**MADHYA PRADESH**  
**WHEAT**  
 PERCENTAGE OF NET-CROPPED AREA

SCALE OF MILES  
 0 50 100

INDEX

BELON 5 PERCENT	
5-10	Horizontal lines
10-20	Diagonal lines (top-left to bottom-right)
20-30	Diagonal lines (bottom-left to top-right)
30-40	Cross-hatching

quality of wheat is also affected by the "admixture of teora (a cheap quality grain) in many districts varying from 10 to 30 per cent or even more" (1).

In 1893, the acreage under wheat was 4.29 million acres which decreased to 2.94 million acres in 1903-4 - within a short period of 10 years (2). Fluctuation between 1913-14 and 1952-53 can be envisaged from the table given below (3).

Table No.22. Showing average acreage under wheat during different quinquennia in M.P.

<u>Quinquennium ending:</u>	<u>Average (million acres)</u>
1913-14	3.43
1933-34	3.30
1938-39	3.38
1945-46	2.71
1952-53	2.52 (Estimate)
	(Estimates)

The shrinkage in the acreage during the period 1893 and 1904 was due to its being "largely supplanted by jowar (large millet), and also, in the south, by cotton" (4). The variation in area between 1909-10 to 1945-46 was between

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- (1) Wheat Marketing Report, op.cit., p.5.  
 (2) Imperial Gazetteer of India, Provincial Series, Central Provinces, Calcutta 1908, p.39.  
 (3) Wheat Marketing Report, op.cit., p.2, and Estimates of Area and Production, op.cit., p.13.  
 (4) C.P. Gazetteer, op.cit., p.39.

3.89 million and 2.45 million acres (1). This is due to "the competition of wheat with linseed, grain, masur, teora and cotton, character of the monsoon and conditions at sowing time, relative prices of the competing crops and their demand, and the successive failure of the wheat crop due to cold, frost, hailstorms and rust" (2). Since 1947-48, there has been a gradual increase in acreage, except in 1952-53, as is evident from the table below (3) (Fig. 41).

Table No. 23. Showing acreage under wheat during 1947-48 to 1952-53 in M.P.

<u>Year</u>	<u>Area (million acres)</u>	
1947-48	1.75	
1948-49	1.89	
1949-50	2.59	
1950-51	2.64	} (Estimates)
1951-52	2.81	
1952-53	2.68	

The recent trend in increase is due to the government efforts to increase foodgrain production to meet the deficit. The total effect of this shrinkage has been that a state which once was an exporter of wheat has become an importer.

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(1) Wheat Marketing Report, op.cit., p.44.

(2) Ibid, p.44.

(3) Agricultural Statistics, op.cit., p.248, and Estimates of Area and Production, op.cit., p.13.



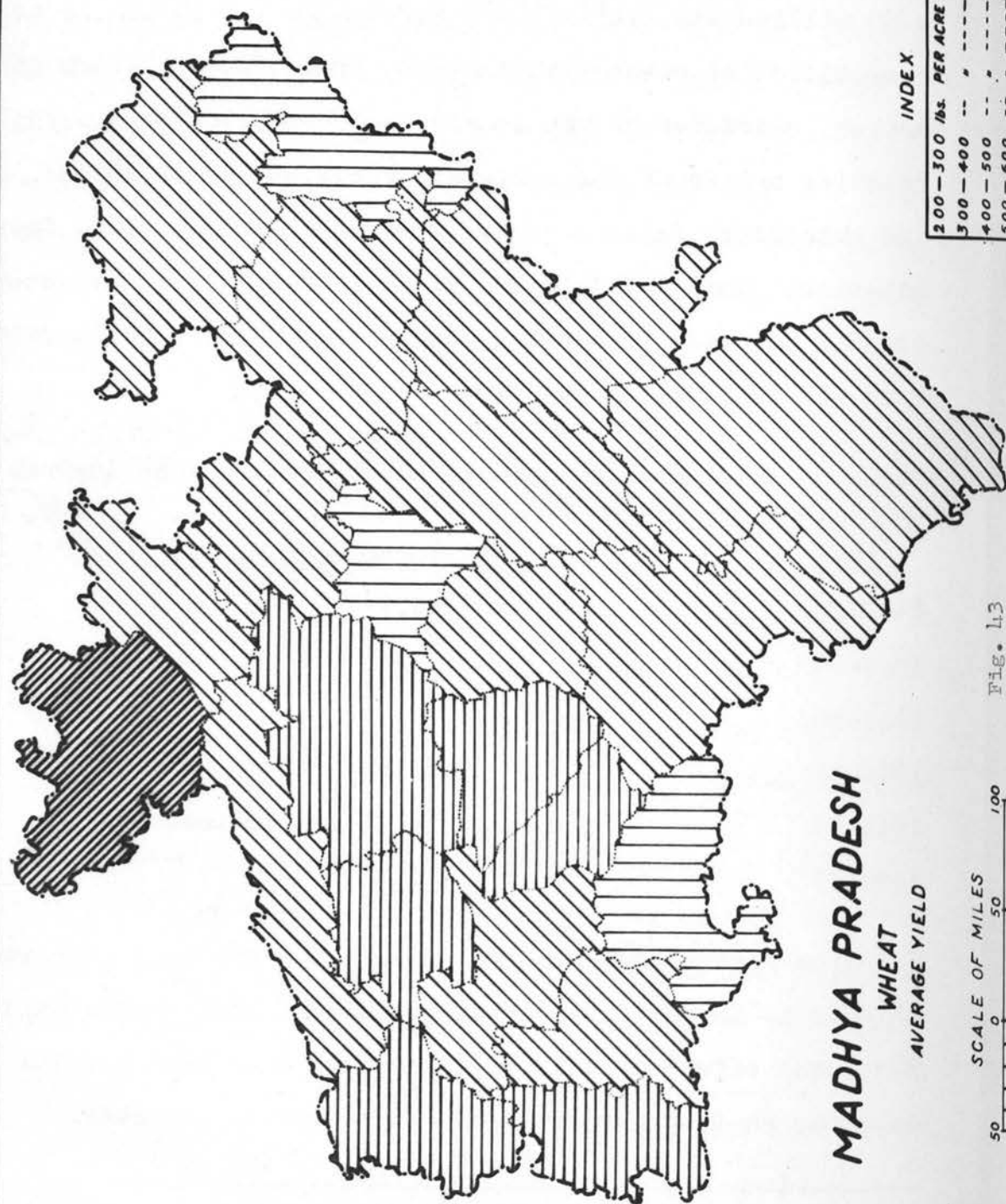


Fig. 113

Wheat is grown in all the districts of the state, but is concentrated in a wheat zone. The districts of Betul, Chhindwara, Hoshangabad, Jabalpur, Mandla and Sagar, on the average, contribute 64% of the total wheat acreage of the State (1,329,489 acres out of 2,078,168 acres). If the districts of Akola, Amravati, Buldana, Nagpur and Wardha of cotton zone and the Durg district of rice zone, where it is an important crop, are included, these 12 districts together occupy, on an average, 86 p.c. of the wheat acreage of the State (1,789,835 acres out of 2,078,168 acres).

A small quantity of wheat is grown by irrigation (Fig.35). On the average it was 1.5 p.c. before the second world war, and increased to 2.1 p.c. during the quinquennium ending 1945-46. It then decreased to 1.5% at the end of quadrennium 1949-50. (Only 34,500 acres out of the average of 2,267,000 acres were irrigated.)

In yield per acre, M.P. is sixth among the Indian States - 457 lbs. per acre in 1952-53 (1). Not only is yield per acre low, but it is gradually decreasing till 1949-50 as can be envisaged from the table given below (2) (Fig.43).

- (1) Das Gupta, A. - Economic and Commercial Geography, Calcutta 1955, p.513.
- (2) Census of India, 1951, Vol.VII M.P., Part 1-B, Nagpur 1953, Table 4.17, p.113.

Table No.24. Showing average yield per acre of wheat in M.P.

Quinquennium ending:                      Average yield per acre in lbs.

1914-15    552

1919-20    567

1924-25    566

1929-30    440

1934-35    451

1939-40    436

1944-45    370

1949-50    320

This state of affairs is due to unsatisfactory preparation of land before sowing, rust in epidemic form, and the spread of 'Kans' (weeds). Climatic hazards have also been significant including unfavourable monsoons, frosts and hailstorms. Soil is losing fertility as wheat is cultivated continuously from year to year and without rotation. To increase the yield per acre it is necessary to have irrigation facilities, use of green manuring, compost and chemical fertilizers, rotation of crop and eradication of weeds. Irrigation can increase the productivity. Even if one irrigation is given there is an increase of 50% in productivity (1). One choudhri of

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(1) Choudhri, B.L. - The Powarkhedi Method is worth a trial, Indian Farming, Vol.VI No.12, March 1957, Delhi, p.35.

Hoshangabad district increased the yield on his plot from 260 lbs. to 2,370 lbs. (average for Hoshangabad is 320 lbs. per acre) with the help of green manuring, compost, chemical fertilizers and double irrigation.(1) The Wheat Breeding Station at Powarkheda (Hoshangabad district) has evolved suitable rust-resistant varieties (No.11 and No.65) which are both high-yielding and rust-resistant (2). The rotation of wheat with tur or gram gives higher yield of wheat. The soil regains from tur or grain what is lost in wheat. Weed can be eradicated if "Fernaxone" is sprayed about a fortnight after the first irrigation (3). Sen has recommended certain improved varieties of wheat for M.P.(4).

Although population in 1941 increased by 18% over the population of 1911, there was a decrease of 50% in wheat production. Since 1948-49, the Estimates of Area and Productions give a gradual increase in production and the average estimated production during the quinquennium ending 1952-53 was 518.4 thousand tons. The main use of wheat in the state is for human consumption after converting it into flour.

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(1) Choudhri, B.L. Op. cit. p.32.

(2) Ibid, p.35.

(3) Ibid, p.37.

(4) Sen, S. - Hints to the Farmers: Wheat and Barley, Indian Farming, Vol.II No.5, August 1952, Delhi, p.9.

Some quantity of wheat flour is utilized for sizing cloth in cotton spinning and weaving mills. The average consumption in mills for the quinquennium ending 1945-46 was 219 tons only (1).

With the decrease in acreage, there has been a reciprocal decrease in production as is evident from the table given below (2).

Table No.25. Showing average production of wheat during different quinquennia in M.P.

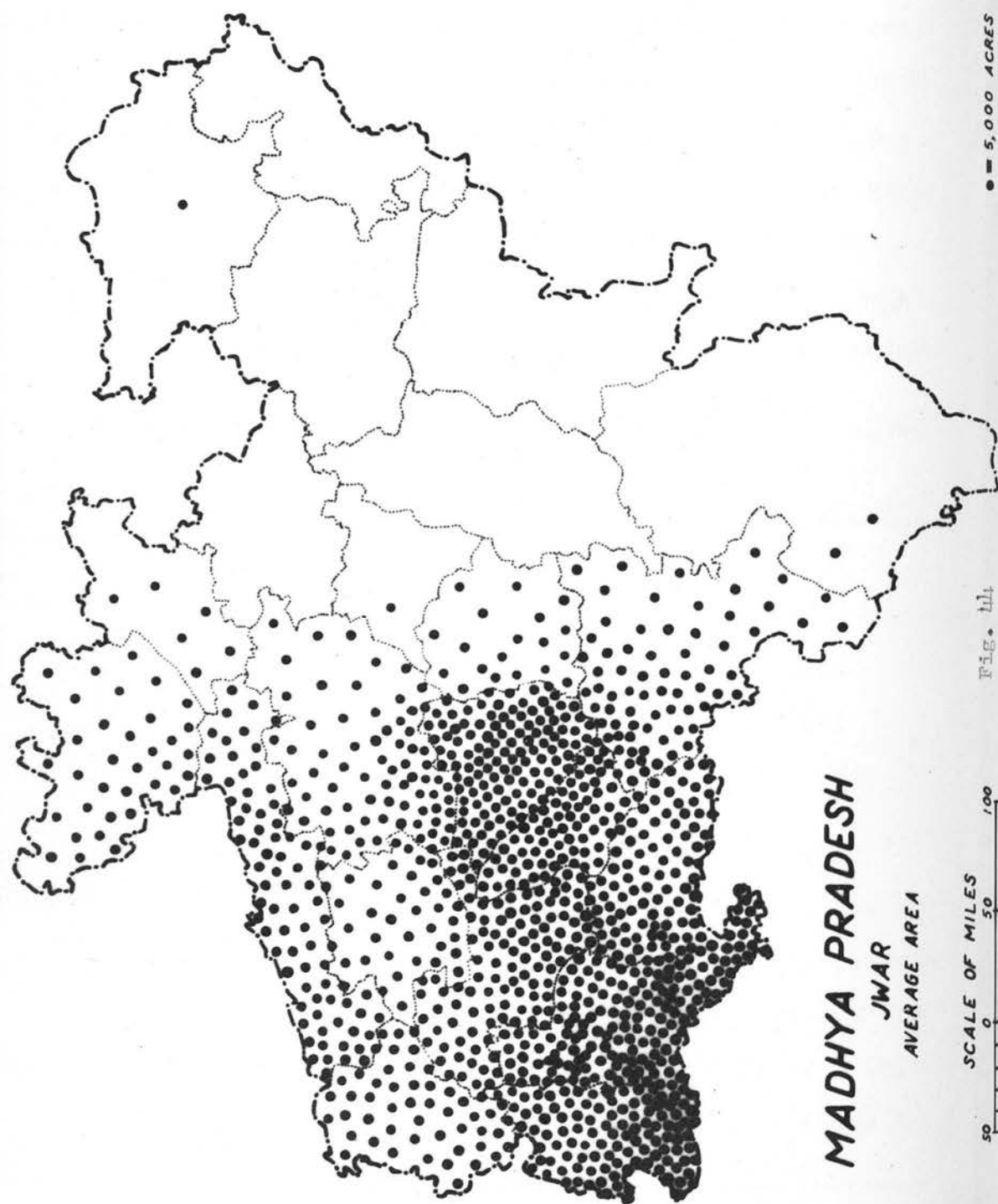
<u>Quinquennium ending:</u>	<u>Average (thousand tons)</u>
1913-14	893
1933-34	653
1938-39	672
1945-46	442
1952-53	518.4 (Estimate)

The present situation is that there is a gradual decrease in acreage, absolute production, and yield per acre in the State, while there is a gradual increase in population. This has resulted into converting a surplus State into a deficit one. There are only two ways to meet the normal requirements of the ever growing population - either to increase the output

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(1) Wheat Marketing Report, op.cit., p.14.

(2) Wheat Marketing Report, op.cit., p.6 and Estimates of Area and Production, op.cit., p.13.





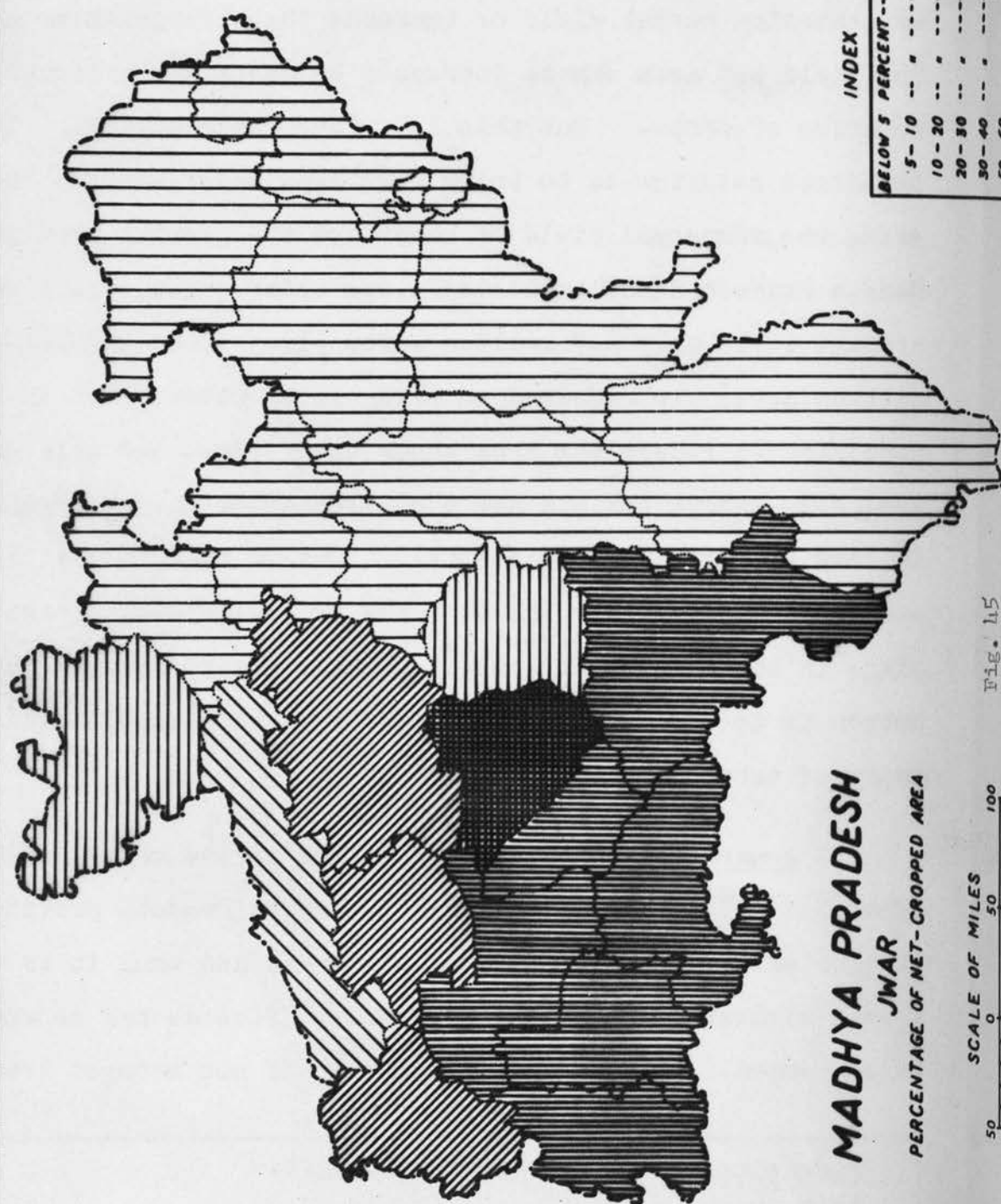
by achieving normal yield or increase the acreage under wheat. The yield per acre can be increased by manuring, irrigation and rotation of crops. But this is a long range policy. The immediate solution is to bring more land under wheat. Considering the subnormal yield of wheat and the growing population, Madhya Pradesh needs 4 million acres under wheat, while on the average it is only 2.7 million acres (1). Thus another 1.3 million acres are required to bring under wheat. It is not necessary to reduce the area under other crops for this extra demand. Madhya Pradesh has 9 million acres under current fallows and culturable waste (2). Out of this, 1.3 million acres can be put under wheat. The expansion should take place in the main wheat zone. Another way to increase the output is to cover as much of wheat area as possible with improved varieties.

3. Jowar (*Sorghum Vulgare*). This is one of the most important millets grown in India. Madhya Pradesh provides 12 p.c. of the jowar acreage of all India and thus it is the fourth highest. In M.P. it is next to rice as far as area is concerned. The average percentage of net cropped area in

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(1) Wheat Marketing Report, op. cit. p.4.9

(2) Ibid, p.49.



# **MADHYA PRADESH**

**JWAR**

**PERCENTAGE OF NET-CROPPED AREA**

**SCALE OF MILES**  
 50 0 50 100

**INDEX**

BELOW 5 PERCENT--	
5-10	Horizontal lines
10-20	Diagonal lines (top-left to bottom-right)
20-30	Diagonal lines (bottom-left to top-right)
30-40	Cross-hatch pattern
50-60	Dense vertical lines

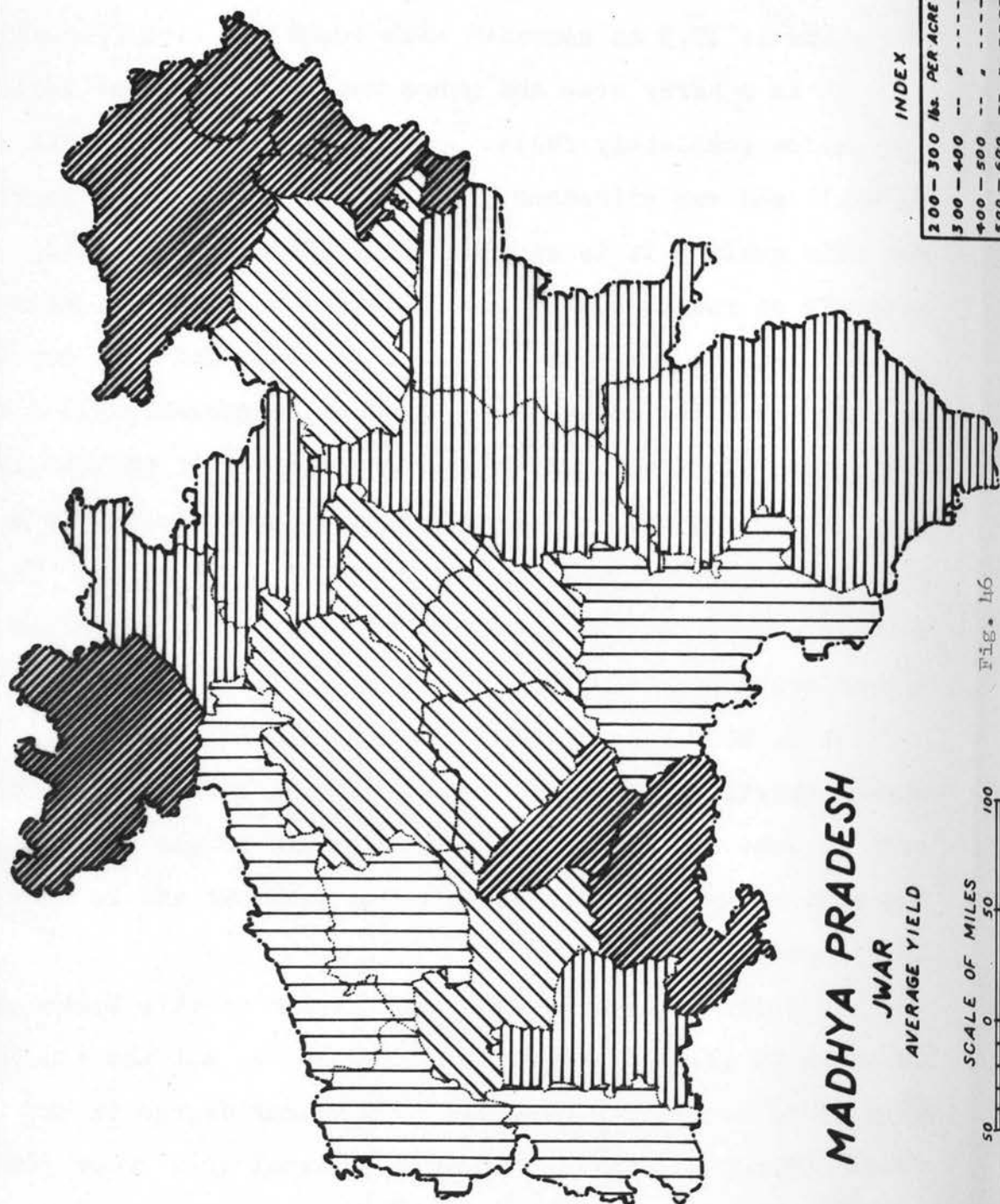
**Fig. 115**

the state is 19.5 as compared with 30.8% for rice (Fig.44) and 45)

It is a hardy crop and grows under all kinds of conditions and seldom completely fails. It is grown in areas with low rainfall and can withstand drought to a considerable degree. For this quality it is an ideal crop for areas depending entirely on rainfall. Since there are various varieties of jowar it can be grown in different seasons, and as a dry crop as well as an irrigated one. In Madhya Pradesh shallow black soil, lying in a thin sheet over the surface of the basaltic rock from which it has been decomposed, predominates in Nimar, Wardha, the west of Nagpur, and south of Chhindwara. This soil is suited for the growth of cotton, jowar, and other autumn crops requiring only light rainfall.

It is both a Kharif and a rabi crop, but in M.P. it is mostly Kharif. In this State the sowing season of the Kharif crop is June and July and harvesting October and November. The rabi crop is sown in October and November and is harvested in February and March.

No jowar acreage is under irrigation in this State. It is grown in all the districts of the State, but the concentration is in the cotton zone and to a lesser degree in the wheat zone. About 64 p.c. of the average total area under jowar is in the cotton zone districts of Akola, Amravati, Buldana, Nagpur, Nimar, Wardha and Yeotmal. If the districts of



INDEX

200 — 300	300 — 400	400 — 500	500 — 600	600 — 700
lbs.	lbs.	lbs.	lbs.	lbs.
PER ACRE	PER ACRE	PER ACRE	PER ACRE	PER ACRE

MADHYA PRADESH

JWAR

AVERAGE YIELD

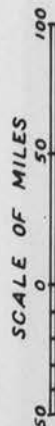


Fig. 46

Betul, Chhindwara, Hoshangabad and Sagar of wheat zone and the Chanda district of rice zone are included the total percentage is about 85.5. There has been an upward trend in the area under jowar but not so steady as with rice. The average estimated acreage for jowar during the quinquennium ending 1952-53 was 4,883,400. (1). (Fig.44).

The yield per acre of jowar has decreased generally during the period between 1910-11 and 1949-50, as is envisaged in the table given below. (2).

Table No.26 showing average yield per acre of jowar in different quinquennia in M.P.

Quinquennium ending-	<u>Average yield in</u> <u>lbs. per acre.</u>
1914-15	574
1919-20	527
1924-25	515
1929-30	516
1934-35	500
1939-40	504
1944-45	492
1949-50	436

If the estimated average yield per acre of 519 lbs. for three years ending 1952-53 (Fig.46) is taken into consideration there is an increase - but this has not reached the maximum

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- (1) Estimates of Area and Production, op.cit., p.8.  
 (2) M.P. Census Report, Part I-B., op.cit.,  
 Subsidiary Table 4.17, p.113.



obtained during the quinquennium ending 1914-15 (1).

The factors responsible for low yield are weeds, pest and diseases and poor varieties of seeds. To destroy the weeds, soil has to be aerated and prepared for the seed.

For this purpose "ploughing with furrow turning plough followed by exposure to hot sun for a month or two is essential...." (2). The important disease of jowar in this State is "smuts", and the biggest pest is 'jowar stemborer' (3). To control pests and diseases the seed must be treated with some kind of fungicide. In case of jowar "Agrosan G.N. has been found quite effective." (4).

Against this low yield per acre must be set the record of one, Bansi Lal S.Bajaj of the Akola district, who got first prize in the jowar competition for 4 years consecutively, 1951-52 to 1954-55. His yield per acre was 5,362 lbs. in 1951-52, 9,477 lbs. in 1952-53, 6,866 lbs. in 1953-54 and 5,700 lbs. in 1954-55 (5). He adopted the

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- (1) Estimates of Area and Production, op.cit., p.52.  
 (2) Verma, R.D. - Hints to Farmers: Maize, Jowar and bajra, Indian Farming, Vol.II, No.4. July 1952, Delhi, p.7.  
 (3) Indian crop calendar, Ministry of Agriculture, Delhi 1950, p.p. 28 and 30.  
 (4) Verma, op.cit., p.32.  
 (5) Baweja, G.S. - New techniques help farmer do good with jowar, I.F. Vol.VI, No.2, May 1956, Delhi, p.4.



Japanese method of paddy cultivation with suitable modification and also used farmyard manure and superphosphate and harrowed the land four times. (1). It is true that every field under jowar is not as fertile and well drained and most of the cultivators cannot use manure to such a great extent. But certainly they can improve in the method of cultivation and gradually increase the yield.

By application of ammonium sulphate a yield of 2,647 lbs per acre was obtained at the Government farm. (2). The Research and Experimental Section of the State Agricultural Department made varietal trial of six strains and achieved the highest yield from the improved Ramkel, followed by N.J. 164 (3).

The total production of jowar has fluctuated between 715 thousand tons and 1,261 thousand tons during the decade 1949-50. The average for the decade 1930-40 was 915 thousand tons and for the decade 1949-50, 992 thousand tons. (4).

4. Other millets. Other millets include maize, bajra and ragi. These are Kharif crops in India. These together occupy about 1.5 p.c. of the total net cropped area of the State. The estimated area and production of these crops for

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(1) Baweja, G.S., op.cit., p.4

(2) Report on the working of the Department of Agriculture, M.P., for the year ending 31st March 1950, Nagpur 1953, p.5.

(2) Ibid. p.5.

(3) Ibid. 1951, Nagpur 1953, p.8.

(4) Progress of Agriculture in M.P. during the period 1941-50 Nagpur 1952, p.26.

the quinquennium ending 1952-53 are shown in the table below. (1)

Table No.27 showing the estimated average area and production of maize, bajra and ragi during the quinquennium ending 1952-53 in M.P.

<u>Crop</u>	<u>Area in acres</u>	<u>Production in tons</u>
Maize	292,600	53,200
Bajra	97,800	15,400
Ragi	34,800	3,800

Maize is known as 'Indian Corn'. It is used both as food and fodder. It is a Kharif crop and depends for its water supply on the south-west monsoon rainfall. It is sown between June and July and harvested between September and November. Maize is cultivated in areas having a rainfall of 40 inches or over. Against wheat maize needs higher temperature and much more summer rain. Rich and well-drained soil are other pre-requisite for harvesting good crop.

The estimate average yield per acre during the quinquennium ending 1952-53 was 515 lbs - very low compared to the yield of the chief maize growing countries of the world. (2) The U.S.A. has increased her yield by introducing high-yielding hybrid corn. With the help of American double hybrid corn

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(1) Estimates of Area and Production, op.cit., pp. 242 and 248.

(2) Ibid., p.54.

Bajra is grown in all the districts of the State, from with local variety of maize, the State Agriculture Department has evolved 4 hybrid strains which give good outturn, exceeding the local variety. (1).

Maize is grown in all the districts of the State. But the districts of Bastar and Surguja of the rice zone and the Chhindwara and Mandla districts of wheat zone together contribute 62 p.c. of the average total area of the State under maize (170,980 acres out of 275,077 acres.) Much of the maize is consumed locally and recently some maize has been utilized for the production of starch and glucose. But with the increase in industrialization, the demand will increase. To meet this increased demand, the Research Section of the State Agriculture Department should try to evolve some high yielding strains.

Bajra is popularly known as poor man's millet. It is generally consumed by the poor section of the society. It is a Kharif crop and is sown between June and September and harvested between October and February. It is a short season crop and generally it is grown on poor soil. It can be grown in areas having a rainfall up to 20 inches. In areas having rainfall above 30 inches it is seldom grown.

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(1) Agricultural statistics, op. cit., p.242.  
 (2) Ibid, pp. 242 and 243.  
 (3) Ibid, p.4

(1) Report of the Agriculture Department, 1950, /op.cit., p.8

Bajra is grown in all the districts of the State, from one acre in Bhandara (1947-48) to 33,010 acres in Buldana (1947-48). (1). The main concentration of bajra is in the Berar districts (Akola, Amravati, Buldana and Yeotmal). These 4 districts together contributed on the average of three years ending 1949-50, 87.8 p.c of the total bajra acreage in the State. (94,554 acres out of 107,621 acres). (2) The estimated average yield per acre for the quinquennium ending 1952-53 was only 354 lbs, which is very low. Out of the total production of bajra in India, one-fourth is exported to other countries, mainly to Sudan, Arabia, Holland, Germany, East Africa and Aden. (3)

Ragi has many valuable features. It is one of the hardiest crops suited for dry farming. It can withstand very severe drought and can be grown with very low rainfall. Besides being grown as a dry crop, it can be grown under irrigation. It has "great nutritive value and is considered more sustaining to people doing hard physical work than any other grain." (4) Unlike other crops, ragi crop and grain are free from pests and diseases.(5) It can be stored for a long period, even for 50 years, if stored properly avoiding

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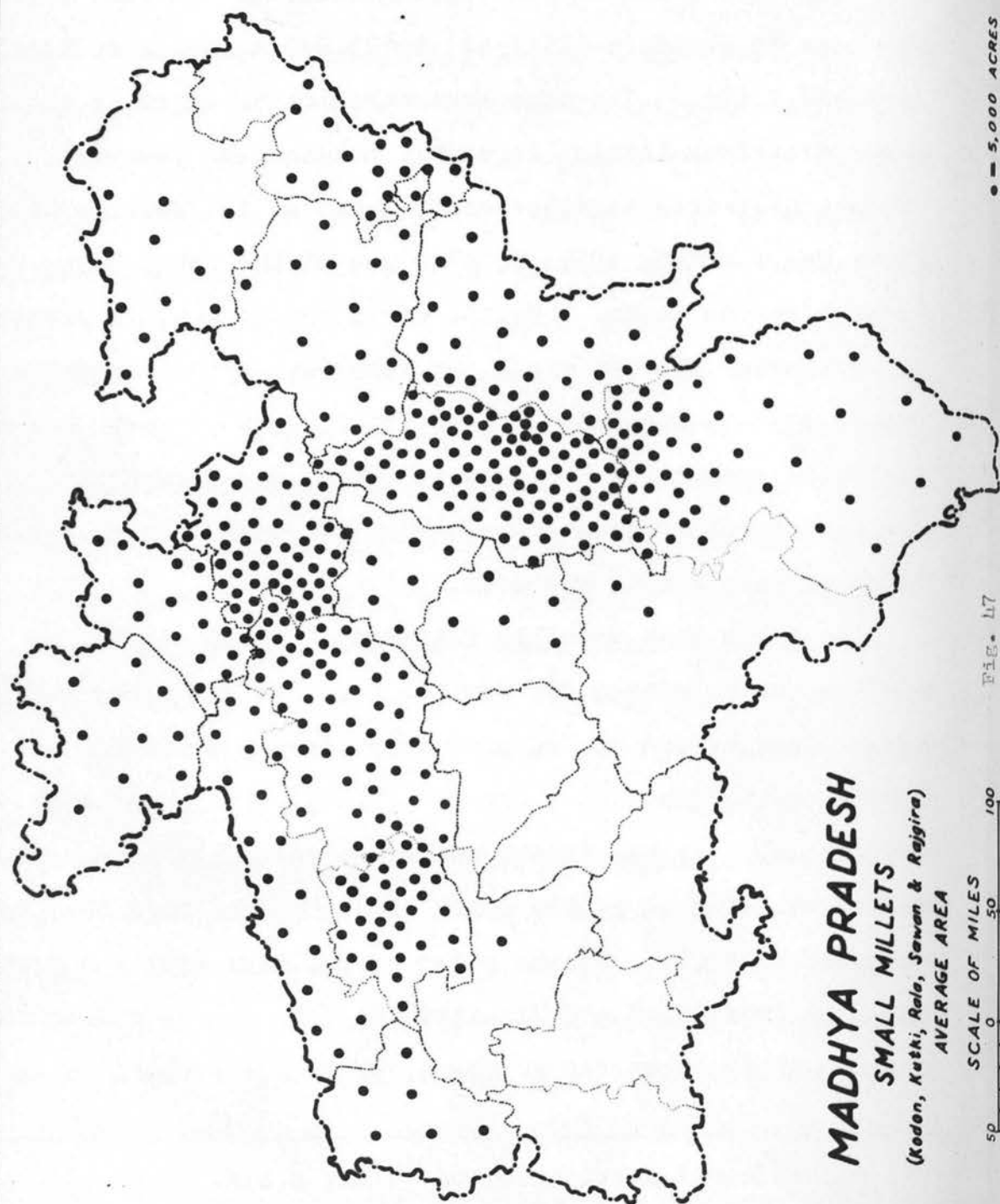
(1) Agricultural statistics, op. cit., p.242.

(2) Ibid, pp. 242 and 248.

(3) Das Gupta, op. cit, p. 516.

(4) Estimates of Area and Production, op.cit., p X

(5) Ibid, p.X



dampness and wetting by water.

Ragi is a Kharif crop. It is sown from May to August and harvested from September to January, depending upon locality. It is grown in almost all districts of the State. But the acreage is only 0.1 p.c of the average net cropped area of the State. Average for the three years ending 1949-50 was only 34,202 acres. (1) Out of this acreage, 18,482 acres, or 54 p.c., was raised in one district only - Bastar. The estimated average yield per acre of ragi in the State during the quinquennium ending 1952-53, was 244 lbs. (2)

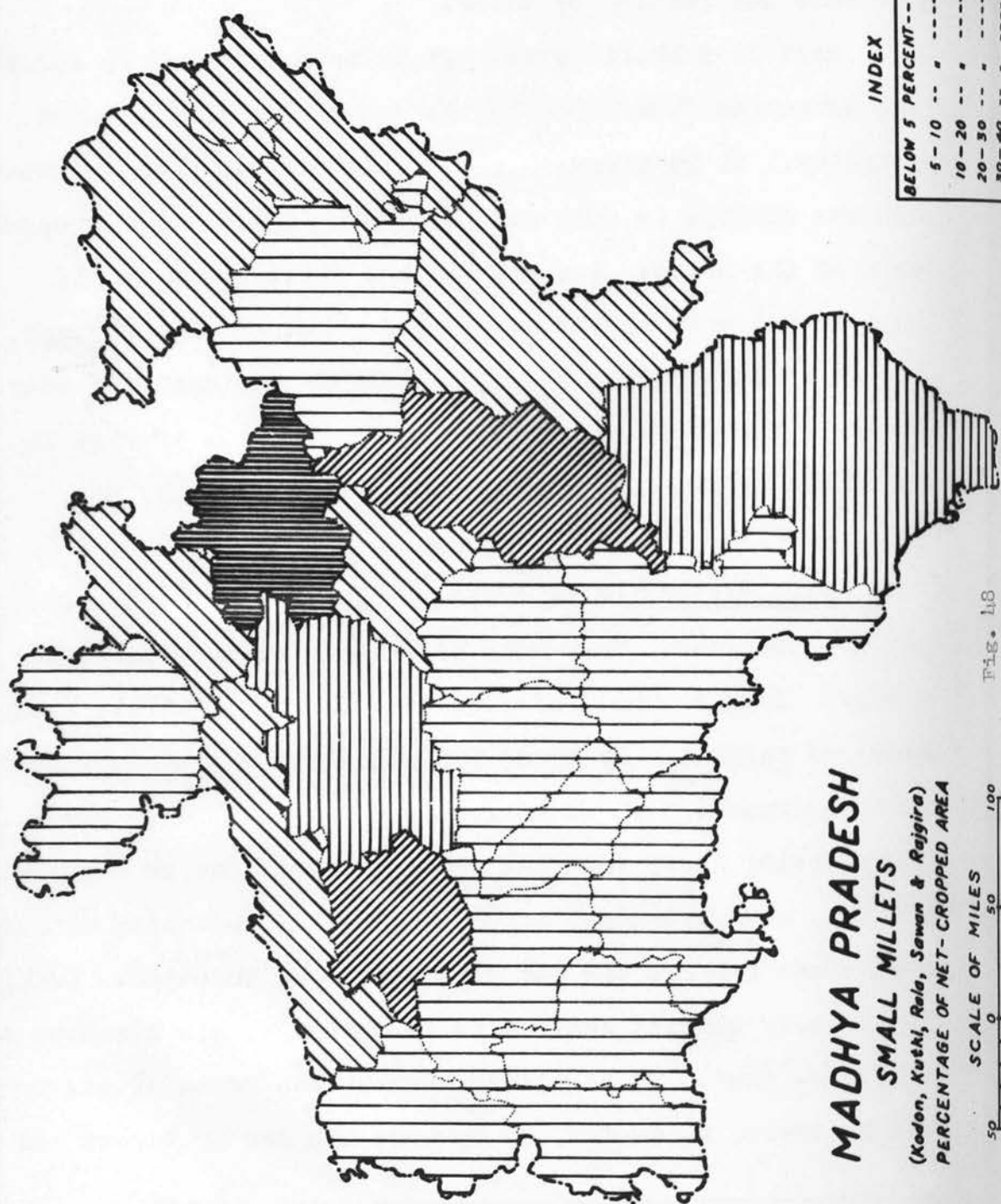
Small Millets (fig. 47-49). These are cereals of minor importance. They have different names in different States. In M.P. small millets include kodon, kutki, rala, sawa and rajgira. Of these kodon and kutki are comparatively more important. These millets are well suited to the areas having heavy rainfall and light soil, as in the plateaus. Kodon is sown broadcast after rice in the beginning of July, and ripens towards the end of October and November. Kutki ripens very quickly and can be harvested within 2 months of its being sown. It is either sown at the break of the monsoon and harvested in August, or towards the end of August and

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(1) Agricultural Statistics, op. cit., p.248.

(2) Estimates of Area and Production, ~~Op. cit.~~ p.54.





# MADHYA PRADESH

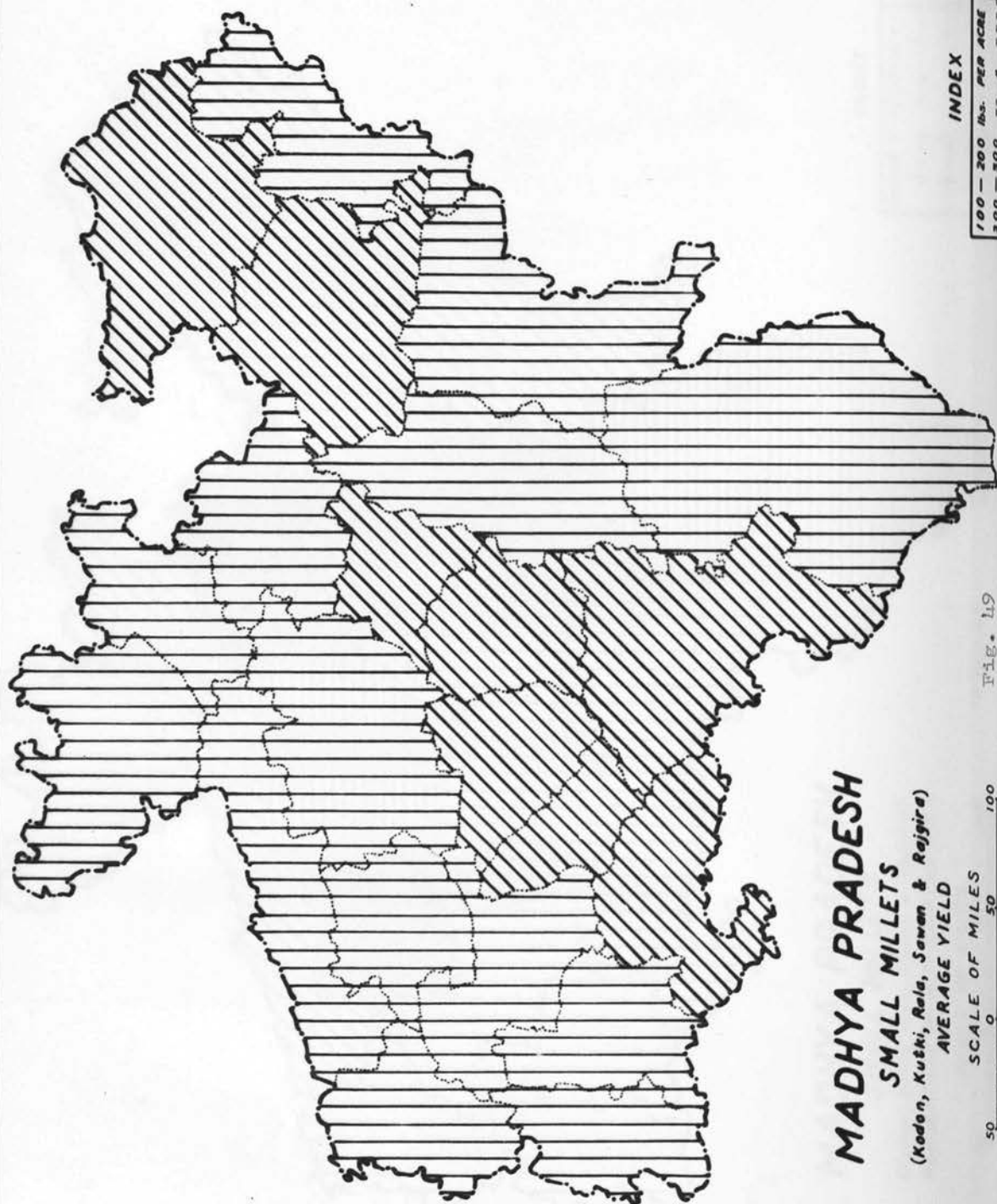
## SMALL MILLETS

(Kodan, Kuthi, Rala, Sawan & Rajgira)  
PERCENTAGE OF NET-CROPPED AREA

SCALE OF MILES  
0 50 100

## INDEX

BELOW 5 PERCENT--	
5-10	---
10-20	---
20-30	---
30-40	---



# MADHYA PRADESH

## SMALL MILLETS

(Kodan, Kutki, Rala, Sawan & Rajgira)

AVERAGE YIELD

SCALE OF MILES

50 0 50 100

Fig. 119

INDEX

100 - 200 lbs. per acre  
200 - 300 lbs. per acre

harvested in October.

Small millets are grown in all the districts of the State. But the concentration is in the districts of Bastar, Betul, Chhindwara, Durg, Hoshangabad, Jabalpur, Mandla, Raigarh and Raipur. These 9 districts together possess 83.2 p.c. of the average total area of the State under these crops. (1) The estimates average area and production of small millets during the quinquennium ending 1952-53 was about 2.26 million acres and 200,400 tons, respectively. (2) (Fig. 47 and 48). During the two decades ending 1949-50, the area has increased but production decreased. The average acreage and production for the decade ending 1939-40, was about 1.534 million acres and 159.1 thousand tons and for the decade 1949-50, 1.591 million acres and 143 thousand tons. (3) It means a decrease in yield per acre. The estimated average yield for the quinquennium ending 1952-53, was 197 lbs. (4) (Fig. 49). The State Agriculture Department has evolved certain strains of kodon and kutki suitable for M.P. (5)

Pulses. Since the overwhelming majority of Indians are vegetarian, pulses constitute an important part of their daily diet. Even the majority of those who are non-vegetarian depend on pulses for economic reasons. Hence, almost in

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Op/cit.

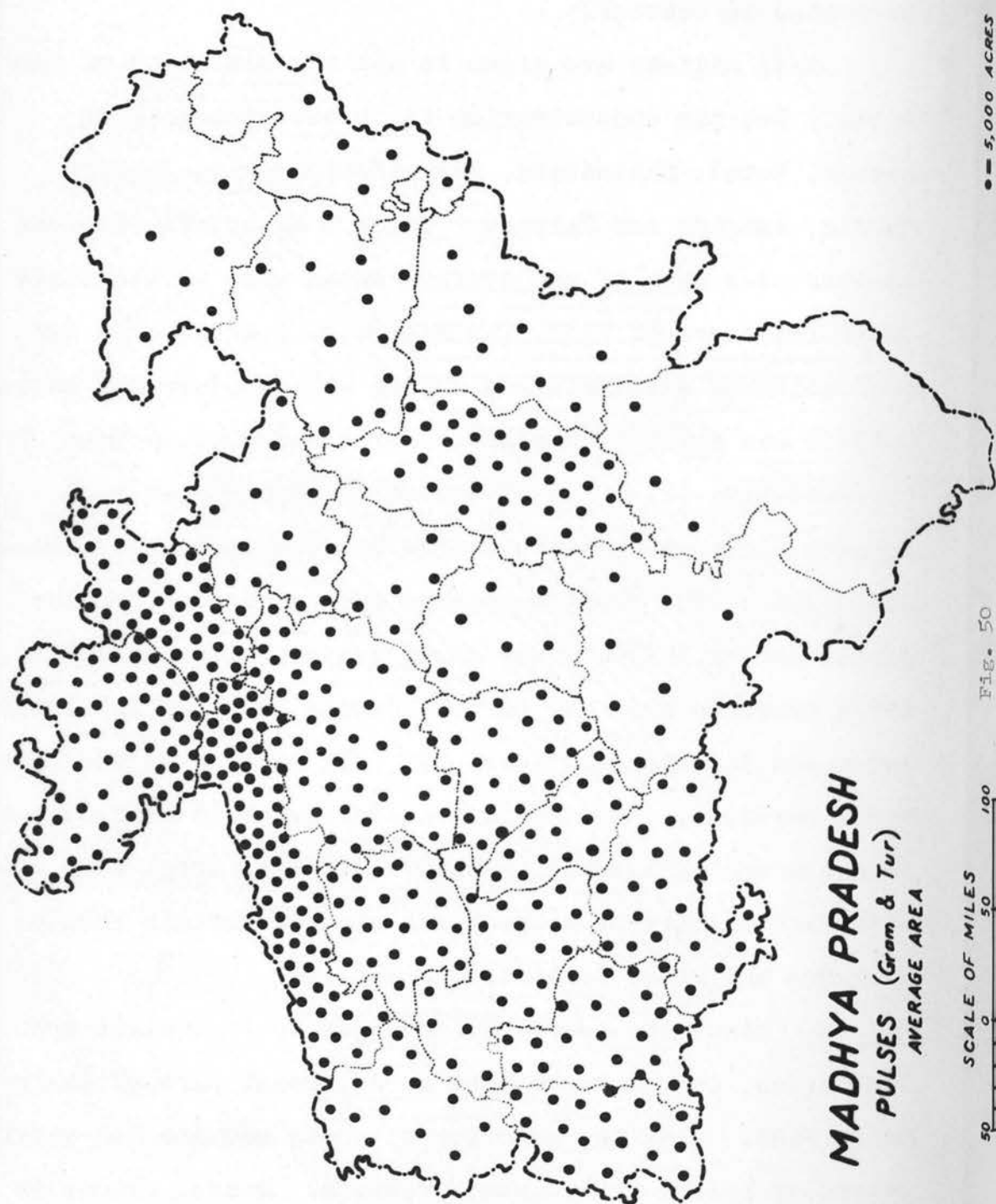
(1) Estimates of Area and Production, pp. 107 and 113.

(2) Ibid, p.11.

(3) Progress of Agriculture, op.cit., pp.22 and 26.

(4) Estimates of Area and Production, op.cit. p.55.

(5) Reports of the Agriculture Dept for 1950 & 1951, op cit pp7 & 9



**MADHYA PRADESH**  
**PULSES (*Gram & Tur*)**  
**AVERAGE AREA**

50 0 50 100  
SCALE OF MILES

FIG. 50

● = 5,000 ACRES

every house one or the other pulse is consumed every day. Being the main source of protein in Indian diets, their nutritional value is very great. There are varieties of pulses grown in M.P. But different kinds of pulses are concentrated in different parts of the States, depending upon climate, rainfall, soil and cultural pattern. The pulses grown in the State are gram (*cicer arietinum*), tur or arhar (*cajanus indicus*), urid (*Phascolus radiatus*), mung (*Phaseolus Mungo*), moth, turia or lakh (*Lathyrus sativus*), masur or lentils (*Ervum Lens*) and peas (*Pisum Arvense*). Gram is concentrated in the wheat zone, tur in the cotton-jowar tract, and urid, mung, moth and lakh in the rice zone.

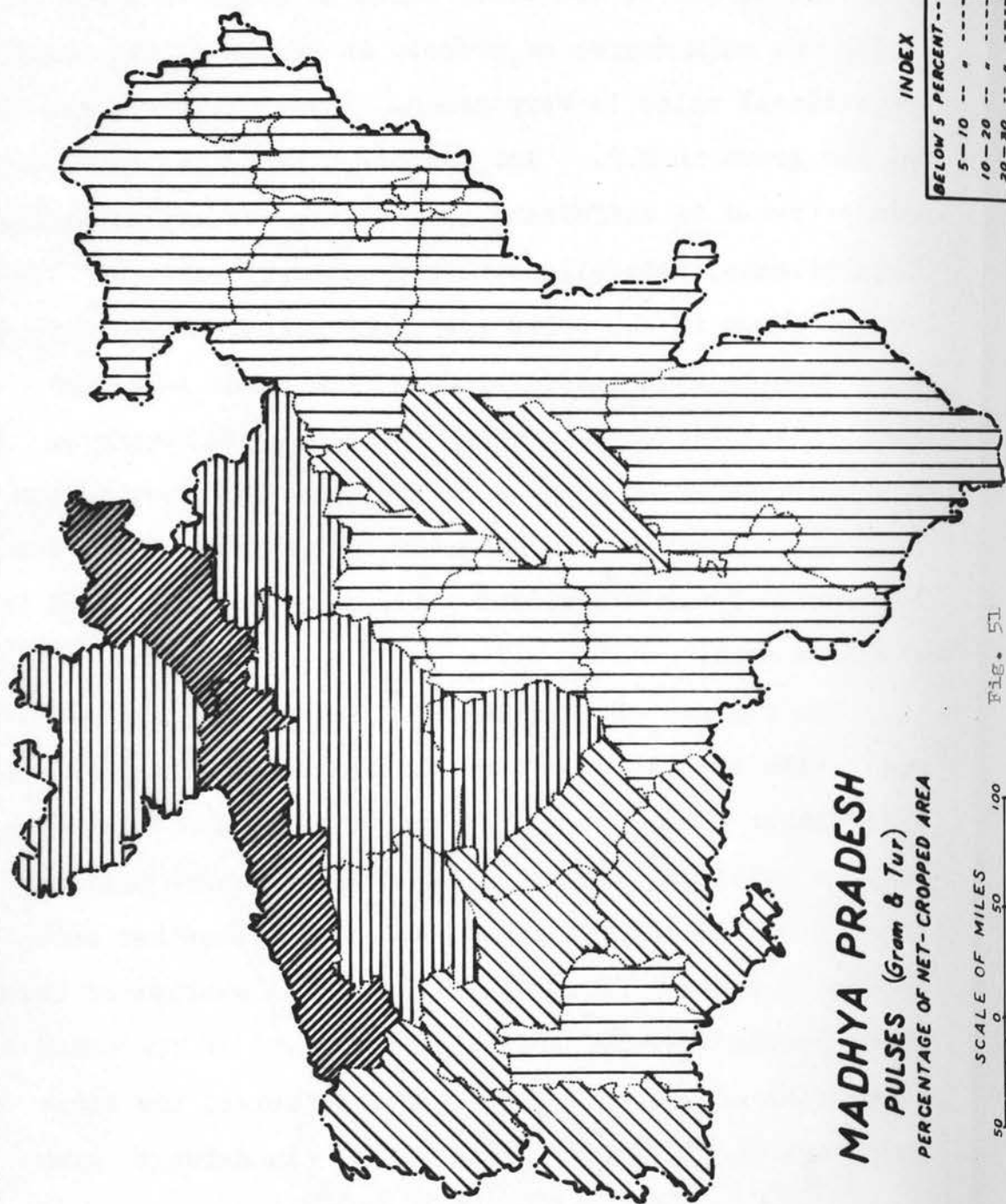
The figures of area and production of all pulses are dealt with in all Government publications (Central and State) under three heads, gram, tur and other pulses. Out of the average total net cropped area for three years ending 1949-50, of 28,353,091 acres, all pulses together occupied 6,425,426 acres - 22.6 p.c. (1) On the average of three years ending 1949-50, gram occupied 25.7% of the total acreage (1,650,411 acres), tur 12.5% (803,488 acres) and other pulses 61.8% (3,971,527 acres). (2) In acreage, gram

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(1) Agricultural Statistics, op.cit. pp.250 and 253.

(2) Ibid, pp. 249 and 250.





**MADHYA PRADESH**  
**PULSES (Gram & Tur)**  
**PERCENTAGE OF NET-CROPPED AREA**

SCALE OF MILES  
 50 0 50 100

Fig. 51

INDEX

BELOW 5 PERCENT	5-10	10-20	20-30
Horizontal lines	Diagonal lines	Cross-hatching	Vertical lines



occupies the first position and tur second. But in production, the reverse is the case - tur is first in position and gram second. The estimated average acreage for the quinquennium ending 1952-53 was 1,522,600 acres for gram and 801,800 acres for tur. For the same period, the estimated production of gram was 280,200 tons and for tur 322,200 tons. (1) The reason is that the estimated average yield per acre of gram during the quinquennium ending 1952-53 was 411 lbs and of tur 889 lbs. (2)

1. Gram (Fig 36, 50-52). This is one of the two most important pulses of India, tur being the second. Madhya Pradesh with 7.8 p.c of the total area under gram in India is third in respect of acreage. (3). Though raised in every district of the State, it is concentrated in the wheat zone districts of Chhindwara, Durg, Hoshangabad, Jabalpur and Sagar. These 5 districts together contribute on the average about 65.3% of the total area under gram in the State. The estimated average acreage under gram during the quinquennium ending 1952-53, was 1,542,600 acres. (4)

Scanty rainfall and little manuring are required to raise this crop. Heavy rain is harmful for it. It is a

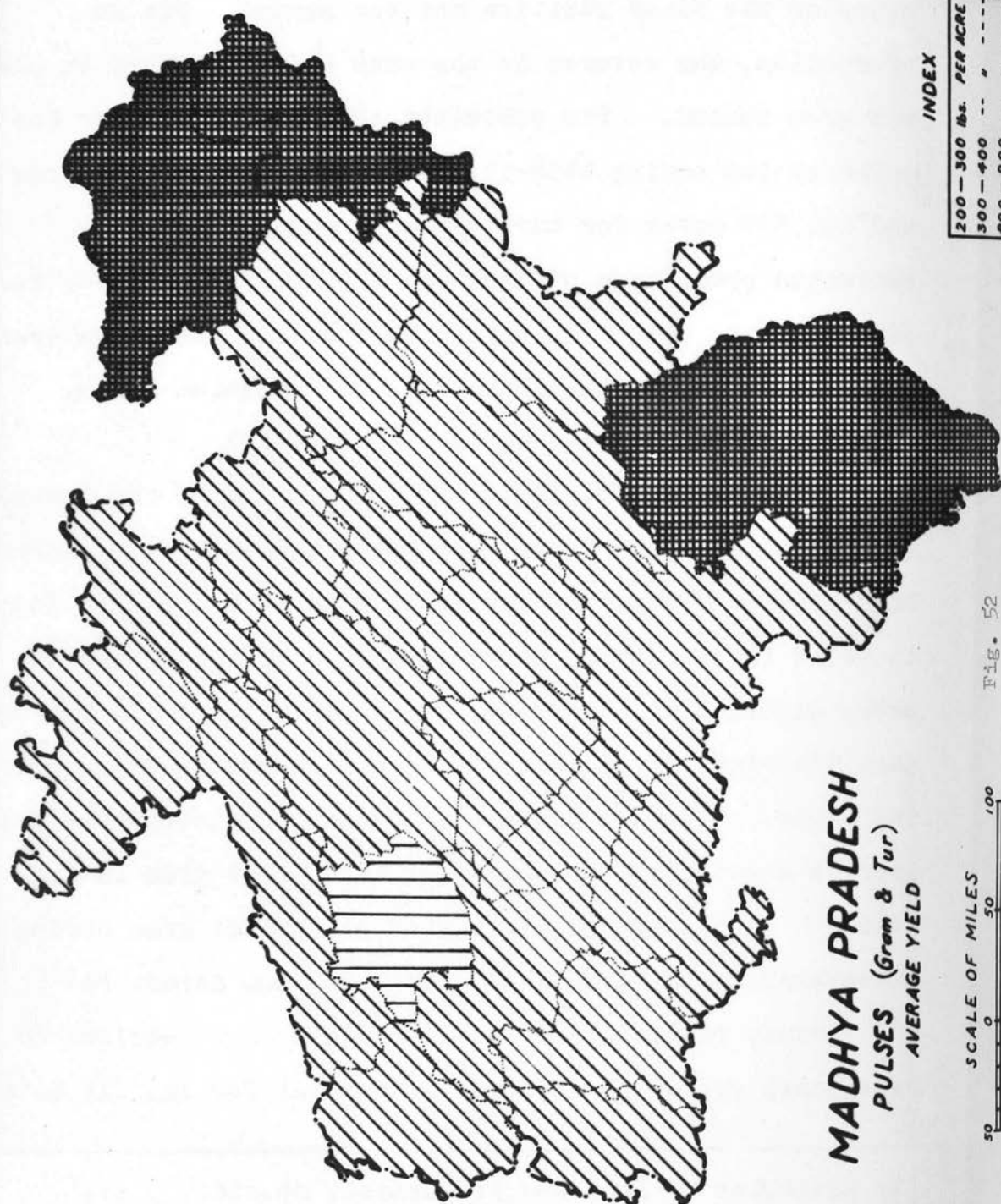
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(1) Estimates of Area and Production, op.cit., p.17.

(2) Ibid, pp. 57 and 58.

(3) Agricultural Statistics, op.cit., pp. XL IV.

(4) Estimates for Area and Production, op.cit., p.17.



**MADHYA PRADESH**  
**PULSES (Gram & Tur)**  
**AVERAGE YIELD**

SCALE OF MILES  
 50 0 50 100

INDEX

200 — 300 lbs. PER ACRE	300 — 400 "	400 — 500 "

Fig. 52

rabi crop, sown during October to December and harvested between March and May. It is cultivated largely with wheat and linseed. It is also grown in rotation with these crops. It helps "to lessen the exhausting effect of these crops, as plants of the pea tribe exercise a recuperative effect on the soil by assimilating nitrogen through the roots". (1)

The estimated average yield per acre for the quinquennium ending 1952-53 for the State is 411 lbs against the all-India average of 452 lbs. (2) Among the 9 major gram producing States of India, Madhya Pradesh is fourth in respect of yield per acre. In 1949, the Government Experimental Farm at Nagpur found the yield of the variety of Dacca to be 915 lbs per acre and at Jabalpur variety ADT-V was 917 lbs. (3) In 1950, the variety ADT-V gave a yield of 1,021 lbs per acre at the Government Farm at Adhartal and the variety Warangal 780 lbs per acre. (4) Thus if improved seed were to be used, the yield per acre could be raised to a considerable extent. The estimated average total production during the quinquennium ending 1952-53 was 280,200 tons. (5)

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(1) C.P. Gazetteer, op.cit., p.41.

(2) Estimates of Area and Production, p.57.

(3) Report of Agriculture Department for 1950, op.cit., p.7.

(4) " " " " for 1951, op.cit., p.9.

(5) Estimates of Area and Production, op.cit., p.17.

2. Tur. (Fig. 36, 50-52) Madhya Pradesh was third in India with 13.4% of the total acreage of the area under tur in 1949-50. (1) The estimated average acreage and production during the quinquennium ending 1952-53, was 801,800 acres and 322,200 tons, respectively. (2)

It is a kharif crop sown from May to July and harvested from December to March. Tur is grown as a dry crop mixed with cereals like jowar, bajra and ragi. It is also grown as a pure crop as well as a rotation crop in black soil land. In Nagpur it is largely mixed with cotton and jowar. Tur is grown in every district of the State, but the concentration is in the 5 districts of Akola, Amravati, Durg, Nagpur and Yeotmal. On an average these districts contribute 52.1% of the total area under this crop.

Among the major tur producing states, Madhya Pradesh tops the list with estimated average yield per acre of 889 lbs at the end of quinquennium 1952-53 against the all-India yield of 565 lbs. (3) The State Government Experimental Farms have evolved certain varieties and strains of tur which give higher yield. (4)

Despite the highest yield per acre in India, there is

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(1) Agricultural Statistics, op.cit., p.XLIV.

(2) Estimates of Area and Production, op.cit, p.17.

(3) Ibid, p.58.

(4) Reports of the Agriculture Department for 1950 & 1951, op.cit. pp. 7 and 8.

still wide scope to increase the yield by introducing improved varieties and strains. If the yield is increased, the extra supply would be able to meet the requirements of the growing population without bringing further acreage under this crop.

3. Other pulses. There is a variety of pulses, other than gram and tur, raised in one or other part of the State. The important pulses grown in this State are urid, mung, moth, lakh, masur, and peas. Urid, mung, moth and lakh are more suited for the rice zone, masur mainly in Jabalpur, Seoni (Chhindwara district), Narsinghpur (Hoshangabad district), Betul and Chhattisgarh, and peas mainly in Raipur and Bilaspur. The pulses grown "in the rice growing parts of the State play an important role in the economies of farming, where, firstly, due to their being grown mostly as 'utera' (catch crop) the cost of cultivation is reduced to the minimum and secondly, the soil is enriched due to the fixation of nitrogen with the help of root nodule bacteria". (1) Lakh, a spring crop, is grown mainly as a second crop after rice and is used mainly for cattle fodder.

In respect of all-India acreage, the State is second to Bihar - 15.6% of the all India total acreage under all

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(1) M.P. Census Report, 1951, Part I - A, op.cit., p.149.



pulses. (1) The other pulses occupy on an average 61.8 p.c of the total acreage under all pulses, 3,571,000 acres out of the total of 5,095,400 acres (the estimated average for the quinquennium ending 1952-53). (2) The districts of main cultivation are Bhandara, Bilaspur, Durg, Raigarh and Raipur in the rice zone and the Chhindwara and Hoshangabad in the wheat zone. These districts contribute 66.3% of the average total acreage of the State under these pulses (2,634,195 acres out of 3,971,527 acres) (3)

These pulses are grown both as kharif and rabi crops. On an average of three years ending 1949-50, 24.4 p.c. (969,177 acres) was under kharif crops and 75.6 p.c (3,002,350 acres) under rabi crop. (4) There has been a change in the proportion of kharif and rabi pulses in the State in the last 50 years. Before 1908, other pulses were "grown almost equally as autumn and spring crops, ..." (5) The reasons for the change in the present proportion (kharif 24.4% and rabi 75.6%) may be greater increase in the acreage of rabi or a change in the cultivation pattern.

The production and yield per acre of individual pulses, other than gram and tur, are not published and, therefore,

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- (1) Agricultural Statistics, op.cit., pp. 243 and 249.
  - (2) Estimates of Area and Production, op.cit., p. 18.
  - (3) Agricultural Statistics, op.cit., pp. 243 and 249.
  - (4) Ibid, p. 249.
  - (5) C.P. Gazetteer, 1908, op. cit., p. 41.



it is only possible to make comments collectively. The estimated average production during the quinquennium ending 1952-53 was 364,000 tons, (1) with the estimated average yield per acre of 228 lbs. during the same period. M.P was fourth among the Indian States. (2) The high yields in Uttar Pradesh (531 lbs per acre) and Bihar (414 lbs) seem due to irrigation, while in low yield States little acreage is under irrigation. Anyhow the State Government Farms have evolved certain strains of high yield. (3)

The pulses are mainly consumed by human beings but "about 15 to 20 per cent is used as cattle feed in the form of broken and husks". (4) In connection with the export of all types of pulses (i.e. including gram and tur), the Census Report, 1951, says that "Though actual figures are not available it is estimated that the pulses contribute a substantial quota in the export trade of the State." (5)

(1) Estimates of Area and Production, op.cit., p.18.

(2) Ibid, p.58.

(3) Reports of the Agriculture Department for 1950 and 1951, op.cit., pp 7 and 9.

(4) Census of India, 1951, Vol. VII M.P., Part I - A Report, op. cit., p.149.

(5) Ibid, p.149.

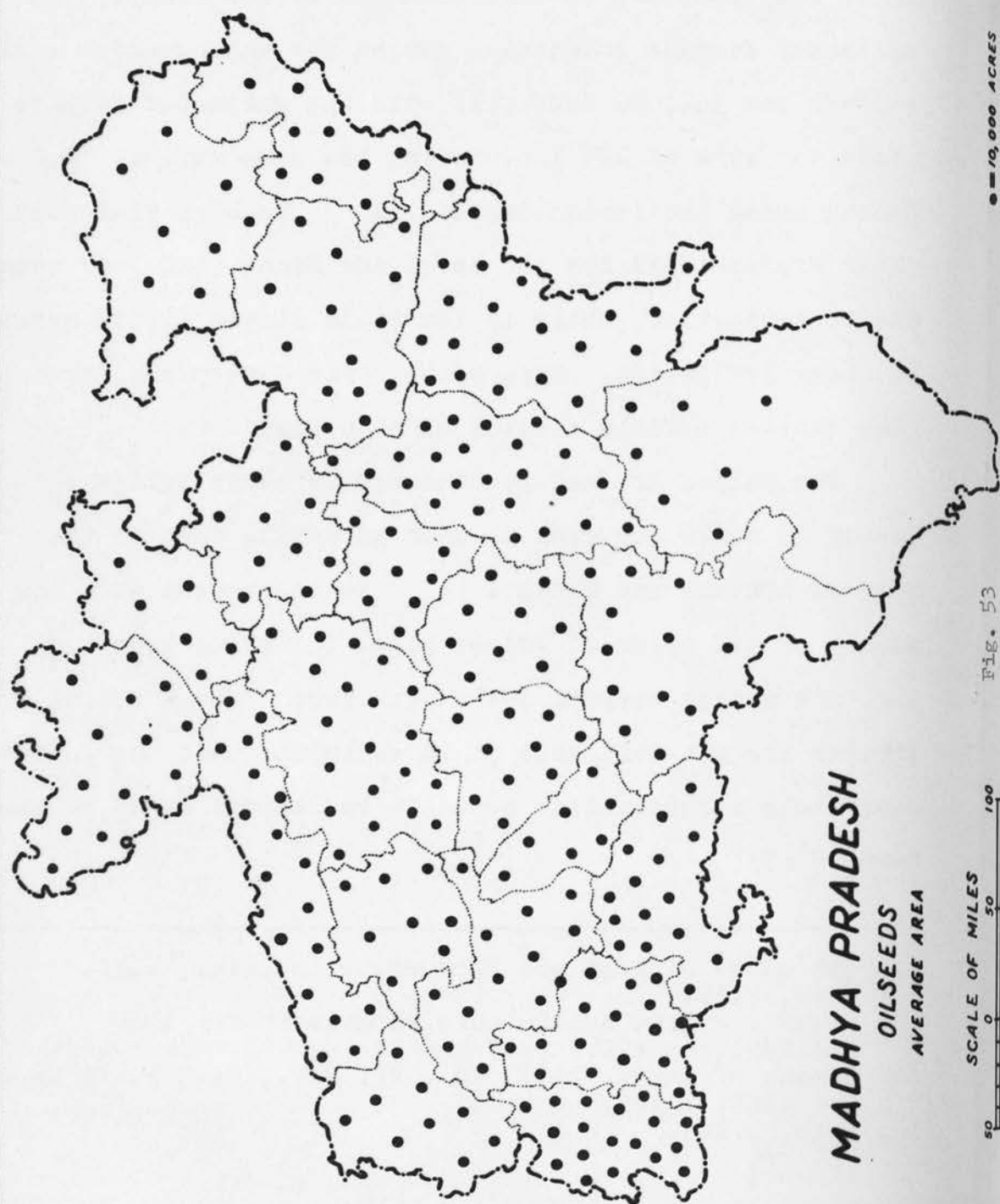


Fig. 53

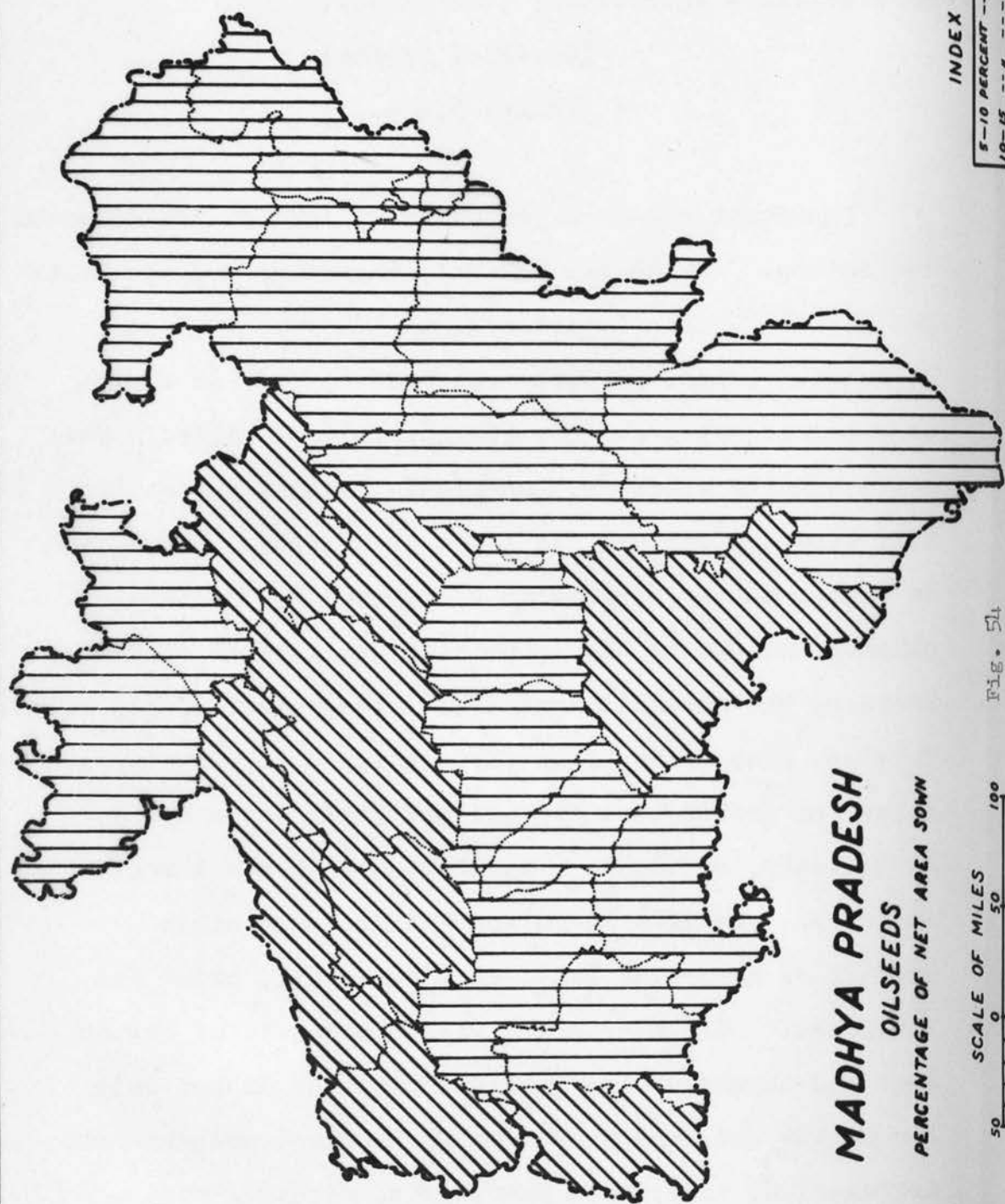
## Chapter VI. - Agriculture (continued).

### (Non-Food Grains)

(Figs. 53-74.)

Important non-food grains grown in M.P. are oilseeds and cotton. These are not only important for the State but have all India importance.

Oilseeds. (Figs. 53-60). Oilseed in M.P. is a cash crop and is not grown for its nutritional value. The State exports oilseeds, especially linseed, groundnut, til, rape and mustard, in large quantities. Thus it is a good earner of foreign currencies for India. Oilseeds helped in the industrial development of the State by the establishment of a large number of oil mills. They are also responsible for setting up a very large number of ghanis (country oil crushers, drawn by man or bullock), which are a great boon as a small scale industry. Besides mills and ghanis, some other industries have also grown up - vanaspati, paint and varnishes. Oilcakes are a valuable source of cattle feed and manure. The demand of oilseed is not only for salads and food, but also for medical preparations, perfumeries, varnishes, lubricants, candles, soap



**MADHYA PRADESH**  
**OILSEEDS**  
**PERCENTAGE OF NET AREA SOWN**

SCALE OF MILES  
50 0 50 100

Fig. 54

INDEX

5-10 PERCENT ---  
10-15 ---  
15-20 ---

manufacture and other purposes. It is a fact that India has not yet made the best use of her oilseed resources, though local oil-crushing industries have been developed to a great extent. To meet the increased local demand and to earn foreign exchange India needs to increase her oilseed production.

The principal oilseeds grown in M.P. are linseed, groundnuts, sesamum, rape and mustard. They can be grown successfully on all varieties of soil - especially in the black and red soils of the south. They "usually do not flourish on acidic or very alkaline soils...(and) cannot stand very wet soil conditions" (1). They are important rotation crops on all types of soil. They require relatively little water and very little manure(2). "Their success "Raheja says," depends upon the cultivation given to the soil and their sequence in the rotation"(3).

Madhya Pradesh contributes 11.3 p.c. of the total area under all oilseeds in India, ranking fourth (4). Oilseeds occupy 9.9 p.c. of the average net cropped area.

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- (1) Raheja, P.C. - Hints to the Farmers: oilseeds, Indian Farming, Vol II No.7. Oct. 1952 Delhi p. 8.
  - (2) ibid. p.8.
  - (3) ibid. p.8.
  - (4) Agricultural Statistics, op. cit, p.XLVII

under all crops in the State. The average area and percentage of all oilseeds are given in the table below: (Figs. 53-54). (1)

Table No. 28 showing average area and percentage of all oilseeds in the State.

<u>Oilseed</u>	<u>Area in acres</u>	<u>Percentage of all oilseeds</u>
1. Linseed	1,126,476	40.3
2. Groundnut	650,982	23.3
3. Sisamum	415,978	14.9
4. Rape and Mustard	165,223	5.9
5. Others	438,773	15.6
<u>Total</u>	<u>2,797,432</u>	<u>100.0</u>

1. Linseed. This has become of great importance during the recent years, because of the great commercial value of its oil and the demand from foreign countries. Linseed is another name of flax-seed. India is the fourth highest producer of linseed and contributes about 10.5 p.c. of the total world production.(2) Among the Indian States, M.P. with 35.7 p.c. of the all-India linseed acreage, is first (3).

The area under linseed during the quinquennium ending 1945-46 was 1,043,000 acres, being 47.0% of the total area under all oilseeds(4). The estimated average acreage

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- (1) Agricultural Statistics, op. cit., p.250  
 (2) Estimates of Area and Production, Op.cit., p.XIX.  
 (3) Agricultural Statistics, op. cit., p. XLIX.  
 (4) Report on Marketing of Agricultural Commodities, No.2 Linseed, Nagpur 1949,p.



during the quinquennium ending 1952-53 had been 1,055, 000 acres - 40.3 p.c. of the total oilseeds area (1) There were violent fluctuation of the area under linseed between 1909-10 and 1945-46 (2). - between 0.447 and 1.859 million acres (2). The factors responsible for the wide fluctuation in area are the climatic condition at the time of sowing, failure or success of Kharif crops and the prevailing price of linseed. Though raised in every district of the State, the main growing districts are Balaghat, Bhandara, Bilaspur, Chanda, Durg, Hoshangabad, Nagpur, Raipur and Sagar. They contribute 83.9 p.c. of the average total linseed area of the State (945,204 acres out of 1,126,476 acres) (3).

Linseed is the earliest of the rabi crops and is sown at the end of September or beginning of October and harvested from the end of January up to March, depending upon the locality. In the black soil zone it is grown as a single crop, while in the rice zone as a second crop after rice. Since it is mainly a rain-fed crop, an

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(1) Estimates of Area and Production, op.cit., P.29.

(2) Linseed Marketing Report, op. cit., p.38.

(3) Agricultural Statistics, op. cit., pp. 244 and 250.

average rainfall of between 30 and 70 inches is best for its cultivation. It is somewhat exhausting.

There are three types of sown linseed - broadcast, drilled, and mixture. Broadcast occupies 38.7 p.c. of the linseed area and is chiefly in the rice zone, drilled 51.4 p.c., and mixture 9.9 p.c. (1). In the broadcast method the seeds are broadcast in the wet rice fields soon after the rice crop is harvested. Hence, in this method there is no necessity for preliminary cultivation. In the other two systems the land is scared with a blade harrow ("bakhar") once or twice in summer and as many times as possible during the break of the rains.

According to size, there are three types of linseed - bold, medium and small. The bold type occupies 43.2 p.c. of the area and the medium and small 56.8 p.c. (2). Medium and small types are raised in the Chhattisgarh districts and the bold in other districts, according to colour one is white or yellow and is known as 'howri' and the other is brown, known as 'Kathi'. Brown is more common than the yellow ones. White or yellow are grown in almost every district. They are mixed with the brown type in proportion of one to about 15. About 4 p.c. of the total

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(1) Linseed Marketing Report, op. cit., p.38.

(2) Linseed Marketing Report op. cit., p.3.

linseed acreage is estimated to be under white or yellow type and the production about 3 p.c. (1). In oil content the white or yellow type is richer than the brown.

The normal standard yield for the State as a whole is 219lbs per acre. But the actual yield for the quinquennium ending 1945-46 was only 152lbs per acre (2).

There has been a slight increase in the estimated yield during the quinquennium ending 1952-53 -- 164lbs. per acre. (3) per acre/ (3). The State Agriculture Department Reports for the years 1950 and 1951 say that the Department is making experiments, and some success has been achieved, to evolve some breeds and strains of high yielding, rust resistant and having high oil content (4).

There has been violent fluctuation in the production of linseed in the State in the present century. The variation has been between 120.4 thousand and 71 thousand tons during the quinquennium ending 1913-14 and 1945-46 (5). The general trend is downward. The estimated average production during the quinquennium ending 1952-53 was 70,000 tons-slight increase. (6) The deviation in

(1) Linseed Marketing Report, op. cit., p.3.

(2) ibid, p.38.

(3) Estimates of Area and Production, op. cit., p.65.

(4) Reports of the Agriculture Department, op. cit., 1950, pp.4 and 8, 1951, pp. 9 and 10.

(5) Linseed Marketing Report, op. cit., p.5.

(6) Estimates of Area and Production, op. cit., p.29.

production had not always been in proportion to change in acreage. At times there has been an increase in acreage, but a decrease in production and vice versa (1). One of the causes of this disproportionate decrease or increase may be the fluctuation in yield per acre in different periods. But the main reason is that linseed is a rain-fed crop and has had to face the vagaries of nature.

In the State, linseed is utilized for two purposes - domestic consumption and extraction of oil. Domestic consumption includes it as an ingredient in pickles, certain medicines and poultices. Linseed is also used for livestock oil is extracted by means of indigenous ghanis and power-driven mills. About 62 p.c. of the linseed produced in the State is utilized by the oil-crushing industry. The small type is crushed in the mills of Chhattisgarh and Chanda and the bold type in Hoshangabad, Jabalpur and Sagar mills. The Amravati, Nagpur, Wardha and Yeotmal mills, crush both types. Ghanis do not discriminate between bold

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(1) Linseed Marketing Report, op. cit., p.5.

or small types. The brown variety is preferred by mills and yellow by ghanis. It is strange that in spite of the fact that white is richer in oil content, mills prefer brown. Unfortunately, the Report on Marketing of Agricultural commodities, No. 2. Linseed, is silent on this point. Since only 4 p.c. of the linseed acreage is under the white type, it forms a negligible quantity for mills demands. Therefore, they have had to content with brown.

The average import of linseed for the quinquennium ending 1945-46 was 3.4 p.c. of the State production, while the export was about 28.6 p.c. of the total production (1). The imports are generally from Central India, Bihar, Orissa, U.P. and Hyderabad. The exports were mainly to Bombay Port (78.2 p.c.) and Madras (20.6 p.c.) (2). The State rarely imports linseed oil as its production <sup>normally</sup> exceeds its internal consumption. It exports about 1,200 tons of oil annually - mainly to Bombay and Calcutta (3). The estimated average production of linseed cake during the quinquennium ending 1945-46 was about 25,600 tons (4). During the prewar period a major portion was exported to

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(1) Linseed Marketing Report, op. cit. pp. 7 and 9

(2) Ibid, p.9.

(3) Ibid, p.17.

(4) Ibid, p.40.

Bombay and Calcutta for re-export to foreign countries. At present, oilcake left over after export, is used for livestock feeding.

One of the important uses of linseed crop in foreign countries is for linen fibre. But it is only "in the cold countries that the crop produces high grade fibre...(1)". Some are of the opinion "that, under Indian conditions linseed cannot be grown so as to give a sufficiently satisfactory yield per acre of flax of good quality...(2)". But in northern India experiments were conducted which "have demonstrated the possibility of profitable cultivation of linseed for fibre"(3)'. Anyhow, at present the crop is cultivated in India for its oilseeds only.

Though this State occupies the first position in respect of acreage among the States of India and has a surplus in linseed and its oil production, it is, nevertheless necessary to increase the acreage under this crop for the reasons given below:

1. Being a money crop it safeguards the financial interests of the cultivator if it is included in the cropping pattern;

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(1) Estimates of Area and Production, op. cit, p. XIX.  
 (2) Ibid, p. XIX  
 (3) Ibid, p. XIX



2. The cost of cultivation is less as compared to other important crops;

3. The cost becomes still less if grown as broadcast after paddy, as this eliminates the necessity of preliminary cultivation;

4. Though the present utilization of linseed oil is mainly confined to edible purposes in M.P., this will be replaced by groundnut oil which is the cheapest of all oilseed oils. Its demand as edible oil may decline but its demand for industrial purposes will progressively rise with the industrial development of the country. The demand will be for the manufacture of varnishes, paints printing inks, floor cloth, artificial India rubber, etc. In all probability the industrial demand will exceed the present production.

5. As an exporter of linseed and its oil, M.P. is an earner of foreign currency for India. It is desirable that in the future also it may maintain its position.

For the above considerations, the State should increase her yield per acre and expand linseed acreage. The yield per acre can be increased by introducing improved strains viz. No. 3 and 55, improved seeds and by evolving better varieties. Madhya Pradesh can easily increase its linseed acreage from the present one million to two million acres

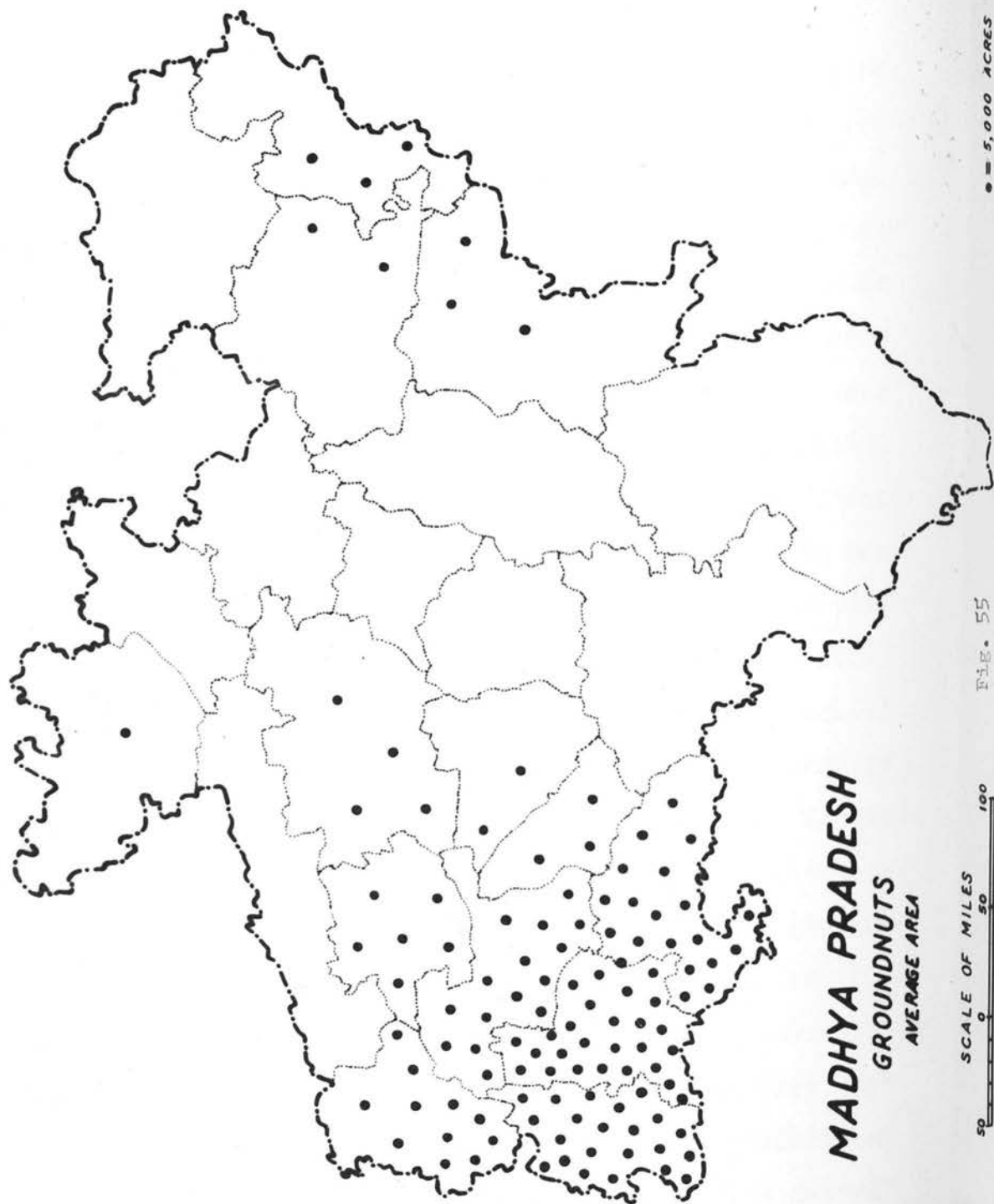
without reducing the acreage of other important crops, especially the staple food crops. This can be achieved by two ways - half a million acres can be cultivated as a broadcast crop and another half a million as a single crop. In the districts of Balaghat, Bhandara, Bilaspur, Durg and Raipur, rice occupies about 5.2 million acres (average for the quinquennium ending 1949-50). Out of this, only 2 or 2.5 million acres are under broadcast crops, such as certain pulses, peas, and linseed. Another half a million acres can also be put under linseed. Madhya Pradesh has still about 9 million acres of land without cultivation as current fallow or cultivable waste (1). Half a million acres of this can be put under linseed as single crop. Another way of increasing production without affecting a change in acreage or yield per acre is to popularise the yellow variety which is richer in oil content.

The storage and transport of oilseeds is defective. There should be big godowns to store the seeds and also "the railway wagons and motor trucks should be so designed as to eliminate the use of gunny bags in transport (2)". Linseed Marketing Report says that "about 5 to 10 p.c. of the

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(1) Linseed Marketing Report, op. cit., p.44.

(2) Ibid, p.46.



**MADHYA PRADESH**  
**GROUNDNUTS**  
**AVERAGE AREA**

oil is lost in transport ... Therefore, to reduce the loss by leakage and to minimise the distribution cost it is suggested that oil should always be moved in tank wagons, which should be made available in sufficient numbers. For transport by road similar tanks of smaller size should be constructed and fitted on motor trucks. (1) The above suggestions also hold good for oils to be dealt with in the following pages.

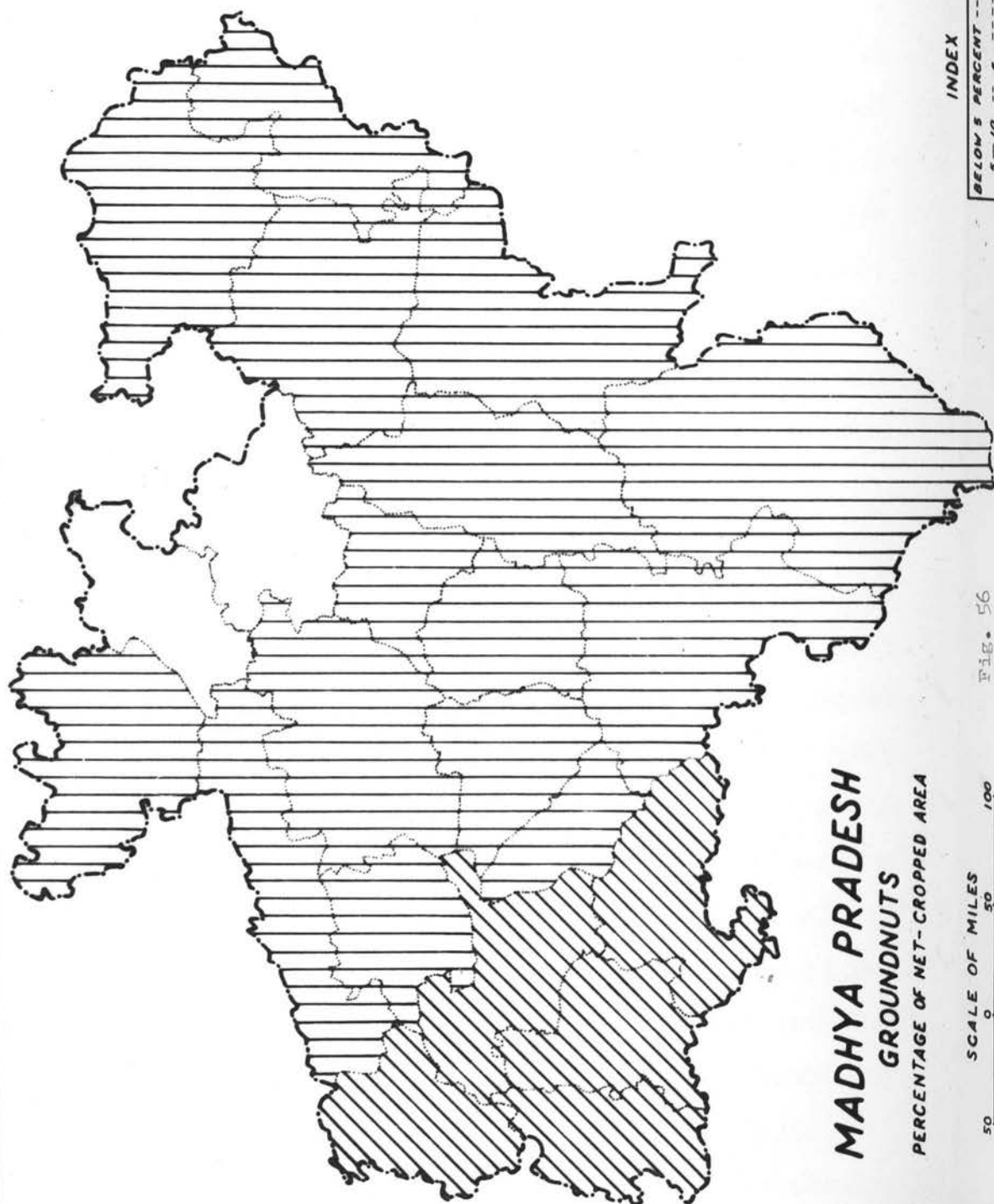
2. Groundnuts. (Figs. 55-57). These have achieved their importance in the world in the present century. About half a century ago groundnuts were a crop of minor importance and were grown as an ordinary crop over small areas. Their importance is due to their commercial value. They are cultivated principally as an oilseed but a considerable quantity is consumed directly. In Europe and America their oil is used in the manufacture of 'margarine', while in India it is used as a cooking oil and is manufactured into vegetable 'ghee' (clarified butter), known as 'Vanaspati'. Vanaspati has come into extensive use during the last 25 or 30 years.

India with about 34.4 p.c. of the total output of groundnuts is the largest producing country in the world (2).

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(1) Linseed Marketing Report, op. cit., p.446.

(2) Estimate of Area and Production, op. cit., p. XVIII.



'Grow More Food Campaign' of the Government of India.

The most spectacular rise was in 1944-45 from 3,826 acres

in 1943-44 to 606,123 thousand acres in 1944-45.

Among the four major groundnut producing States of India,

M.P.'s position is fourth - contributing 7.2. p.c. of the

total area under groundnuts in India (1). They are the

second most important oilseed in M.P., linseed being the

first. The average area under groundnuts during the

quinquennium ending 1945-46 was 384,000 acres or

17.3 p.c. of the total acreage of all oilseeds in the

State (2). During the three years ending 1949-50, the

average was  $\frac{650,982}{338,902}$  acres or 23.3% of the total all oilseeds

acreage (650,982 acres out of 2,797,432 acres) under all

oilseeds (3). (Fig. 55). The trend in acreage shows

a most remarkable increase in the groundnut area.

In 1912-13, the area under groundnuts was only 3,826 acres

which increased to 606,123 in 1944-45 (4). In 1952-53,

the estimated acreage was 513,000 ~~tons~~ (5). Though on

the whole there has been an overall increase in the

acreage, yet in certain years there have been set-backs.

These set-backs were due to adverse climatic conditions,

low prices, more demand for cotton, or the consequence of

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- (1) Agricultural Statistics, op. cit., p. XLVIII  
 (2) Report on Marketing of Agricultural Commodities, No.3.  
 Groundnut, Nagpur, 1950, p.1.  
 (3) Agricultural Statistics, op.cit. p.250.  
 (4) Groundnut Marketing Report, op. cit. P.1.  
 (5) Estimates of Area and Production, op. cit., p.26.



'Grow More Food Campaign' of the Government of India.

The most spectacular rise was in 1944-45 from 302.4 thousand acres in 1943-44 to 606.1 thousand acres in 1944-45 (1)

This was due to the Government's effort to encourage all sorts of subsidiary crops. Since 1949-50, there has been a gradual fall in acreage, from 719.8 thousand acres in 1949-50 to 513 thousand acres in 1952-53. (2) This seems to be due to the partition of India in 1947, which made Indian mills short of cotton, and consequent diversion of some ground-nut acreage to cotton cultivation. Other factors responsible for the fluctuation in area are:

1. Since the ground-nut enriches the soil and the main area is in cotton zone, it has taken over the main rotation of cotton, jowar and ground-nut.

2. Fluctuation in the cotton price is reflected in the fluctuation of the ground-nut acreage.

The crop is raised in every district of the State, from 12 acres in Mandla (1947-48) to 141, 147 acres in the Buldana district (same year). The districts where ground-nuts are mainly grown are Akola, Amravati, Buldana, Nimar, Yeotmal (of cotton zone) and Betul (of wheat zone). These districts,

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- (1) Progress of Agriculture in M.P., op.cit., p.22.
  - (2) Agricultural Statistics, op.cit., p.250, and Estimates of Area and Production, op.cit., p.26.

contribute 85.4 p.c. of the average total acreage of groundnut of the State - 556,161 acres out of 527,444 acres (1).

The crop requires a light soil, with well-defined wet and dry seasons. Groundnuts need a higher rainfall than ordinary dryland crops. The rainfall required for the crop is about 30 to 35 inches. It can be grown under a rainfall of 20 inches, but the yield will be low. It can also stand a higher rainfall of 45 to 50 inches.

It is a rabi crop like rape and mustard. Groundnuts are sown in this State by the end of June and harvested in different times for different types. Bunch or erect varieties are harvested from the end of September till the end of <sup>late</sup> October, while the trailing sort are taken/in-up to the end of December. Groundnuts can be grown both as a dry crop and under irrigation. They are generally grown as a pure crop. But mixed cropping with jowar, castor, bajra, tur or cotton is progressively increasing. They can also be grown by rotation with maize, millet and sorghum. Some early maturing varieties, which mature between 90 and 100 days, have been evolved, which enables the raising of the second crop possible in dryland cultivation also. In the cotton zone, the land is either ploughed with an iron plough or scarred with a blade harrow during winter immediately after jowar is harvested.

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(1) Agricultural Statistics, op. cit., pp. 244 and 250.

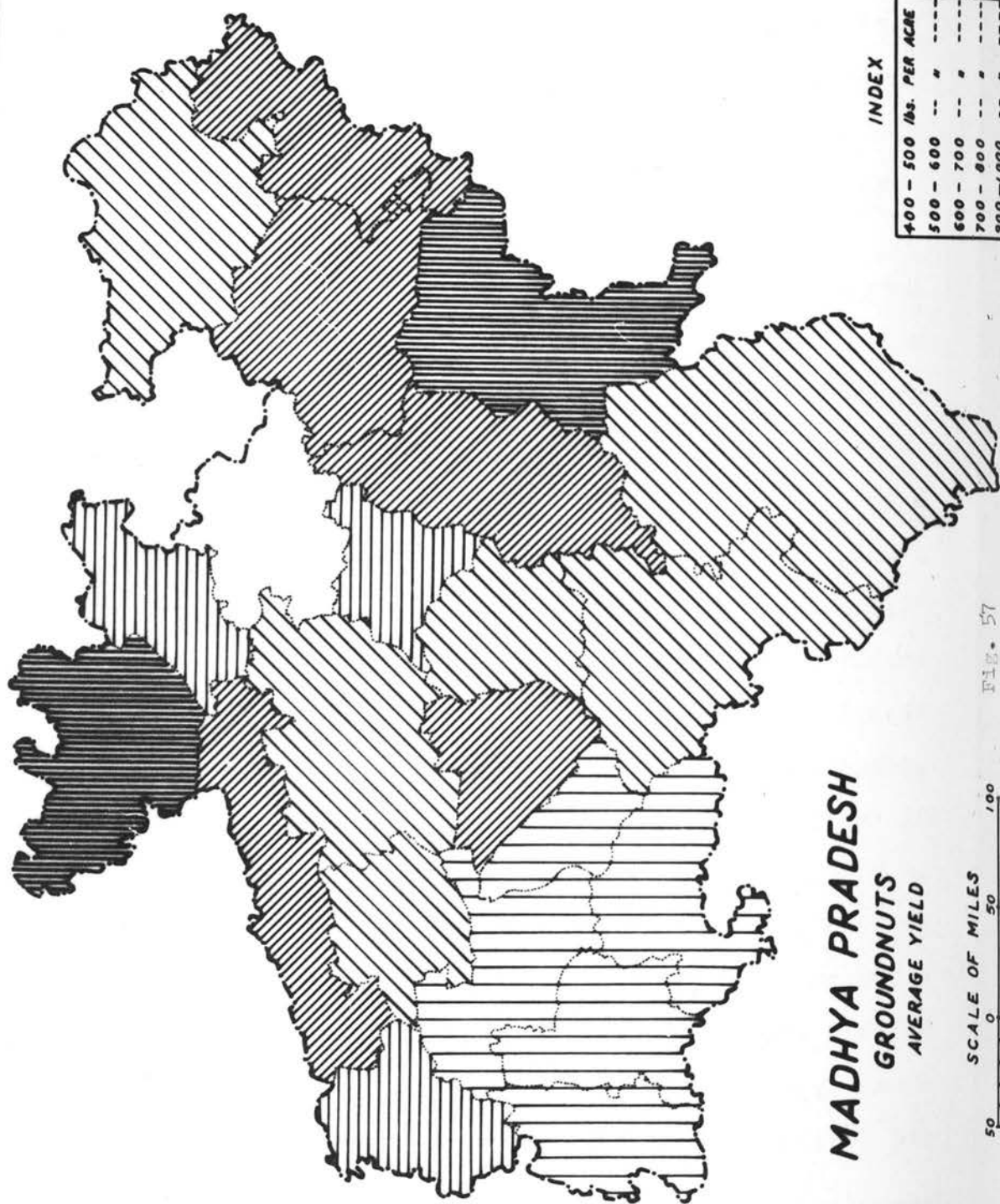
During the summer, it is scarred twice and once after the first rain. Then it is finally scarred after removing jowar stubbles. In other areas it is either ploughed with a country plough or scarred twice or thrice during summer or immediately after the break of the monsoon.

From the point of view of size, there are two types - large and small. The large type includes AK.10, AK.8-11, Raipur local "Dhobdi" or "big Japan". (1) Ak.10 and AK.8, evolved by the State Agriculture Department, are good for table purposes, being sweet in taste. They are of erect type and the districts of Akola, Amravati, Buldana, Yeotmal, Niwar, Betul, Nagpur and Wardha grow these varieties. The Raipur local "Dhobdi" or "big Japan" belongs to the trailing variety and is grown generally in the northern and eastern districts of M.P. Small types include AK.12-24, Spanish peanut and small Japan. They belong to the erect type. AK.12-24 "thrives well on heavy soils and is superior in outturn to both the Spanish peanut and the small Japan". (2). Hence, its popularity with the cultivators. The spanish peanut is grown on high lying soils and the districts of Akola and Buldana are the main areas of its cultivation. The small Japan type is commonly grown in the Amravati, Betul, Nimar and Yeotmal districts. The small varieties" are preferred

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(1) Groundnut Marketing Report, op. cit., p.3.

(2) Ibid, p.3.



INDEX

400 - 500	500 - 600	600 - 700	700 - 800	800 - 1,000
Diagonal lines (top-left to bottom-right)	Diagonal lines (bottom-left to top-right)	Horizontal lines	Vertical lines	Stippled pattern

# **MADHYA PRADESH** **GROUNDNUTS** **AVERAGE YIELD**



by the oilmills to the other varieties on account of their high oil contents" (1). If the nature of the growth is to be taken into consideration, there are two varieties - erect or bunch, and trailing or running. Raipur local "Dhobdi" or "big Japan" belongs to trailing or running variety and the rest to the erect variety. It is not possible to give the acreage under different type and varieties as record is not available (2).

During the quinquennium ending 1945-46, the average yield per acre was 658 lbs. while the estimated yield per acre during the quinquennium ending 1952-53 was 508 lbs. (Fig.57). That is a decrease in yield per acre, suggesting that the soil is losing its fertility. The State Government Experimental Farms are busy evolving new improved strain and hybrid to increase the yield (3).

The annual production during the quinquennium ending 1945-46 was about 110,840 tons (4). The estimated average production for the quinquennium ending 1952-53 was about 132,000 tons (5). Out of the total production "about 19 per cent is retained in villages" by producers for family consumption and seed purposes and by village merchants and others for domestic consumption and for oil extraction by village ghanis (6).

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- (1) Groundnut Marketing Report, op. cit., p.3.
  - (2) Ibid, p.2.
  - (3) Ibid, p.5, and Estimates of Area and Production, op.cit.,p.63.
  - (4) Groundnut Marketing Report, op.cit., p.5.
  - (5) Estimates of Area and Production, op. cit., p.26.
  - (6) Groundnut Marketing Report, op. cit., p.6.

There are two uses of groundnut-for domestic consumption and for extraction of oil. For table purposes the bold type is preferred for its sweet taste. The small type is used in extracting oil since it has a greater oil content. The main use of groundnut oil is for culinary purposes and adulteration of Costlier oils. For industrial purposes, viz. manufacture of soap, not much is consumed. Being the cheapest edible oil, it is adulterated with linseed oil to the extent of 25 p.c. and with til oil 25 to 50 per cent. Whenever permitted it is adulterated with coconut oil. "The large demand for cheap oil", says the Marketing Report, "and the difficulty of distinguishing pure oils from mixed oils without chemical analysis, coupled with the laxity in the enforcement of measures to prevent adulteration in most places, help in widespread adulteration being practised with impunity." (1). Groundnut oilcake is used for manurial purpose and cattle feed. Prior to World War II, not much of the cake was utilized in this State - only about 2,000 tons for manure and cattle feed (2). Since the war, the whole of it is consumed within the State as manure and cattle feed. When there was food scarcity in India, during the last war, "it was reported, this cake was also used as human food, though to a very limited extent" (3).

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(1) Groundnut Marketing Report, op.cit., p.19.

(2) Ibid, p.23.

(3) Ibid, p.23.



During the quinquennium ending 1945-46 the annual average groundnut imports to and exports from the State were 4,767 and 2,765 tons, respectively, both by road and rail.(1) The imports were mainly from Hyderabad, Madras, Bombay and Rajputana and exports to Uttar Pradesh, the Punjab, Madhya Bharat, Calcutta, Bombay Port and Delhi. About 9,000 tons of groundnut oil were imported annually and about 5,000 tons exported during the quinquennium ending 1945-46.(2) The imports were mainly from Hyderabad and Madras States and exports to Uttar Pradesh, the Punjab, Delhi and Madhya Bharat. No oilcake is exported out of the country now due to the Government ban on its export.(3)

In view of the fact that groundnuts are a money crop, that they enrich the fertility of the soil, are the cheapest edible oil, are a valuable food rich in vitamins and supply oilcake valuable as manure and feed, it is desirable to expand acreage in the State. Even though the State is one of the most important producers of various types of oilseeds, it

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(1) Groundnut Marketing Report, op.cit., p.40.

(2) Ibid, p.41.

(3) Ibid, p.35.

Groundnut Marketing Report, op.cit., p.45.

Ibid, p.45.

Tables of Agricultural Statistics for the year ending the 31st May, 1952, Nagpur 1953, p.1.

is deficient in edible oil requirements.(1) Since an acre of groundnuts produces about 226 lbs. of oil and linseed and til seed about 82 lbs., it is desirable to increase the groundnut acreage to 2.2 million acres to meet the shortage. At present the average annual acreage under this crop is about 0.7 million acres. Hence, another 1.5 million acres should be put under this crop. The best area for expansion is Berar and the Nimar district as "the soil, climate and the cropping programme are more suited for groundnut cultivation in these parts than anywhere else in the State" (2). At present 1.73 million acres in Berar and the Nimar district are under current fallow and culturable waste (3). Of the 1.5 million acres to be increased, 1.3 million acres can be increased in the above area and the rest in the other districts of the State.

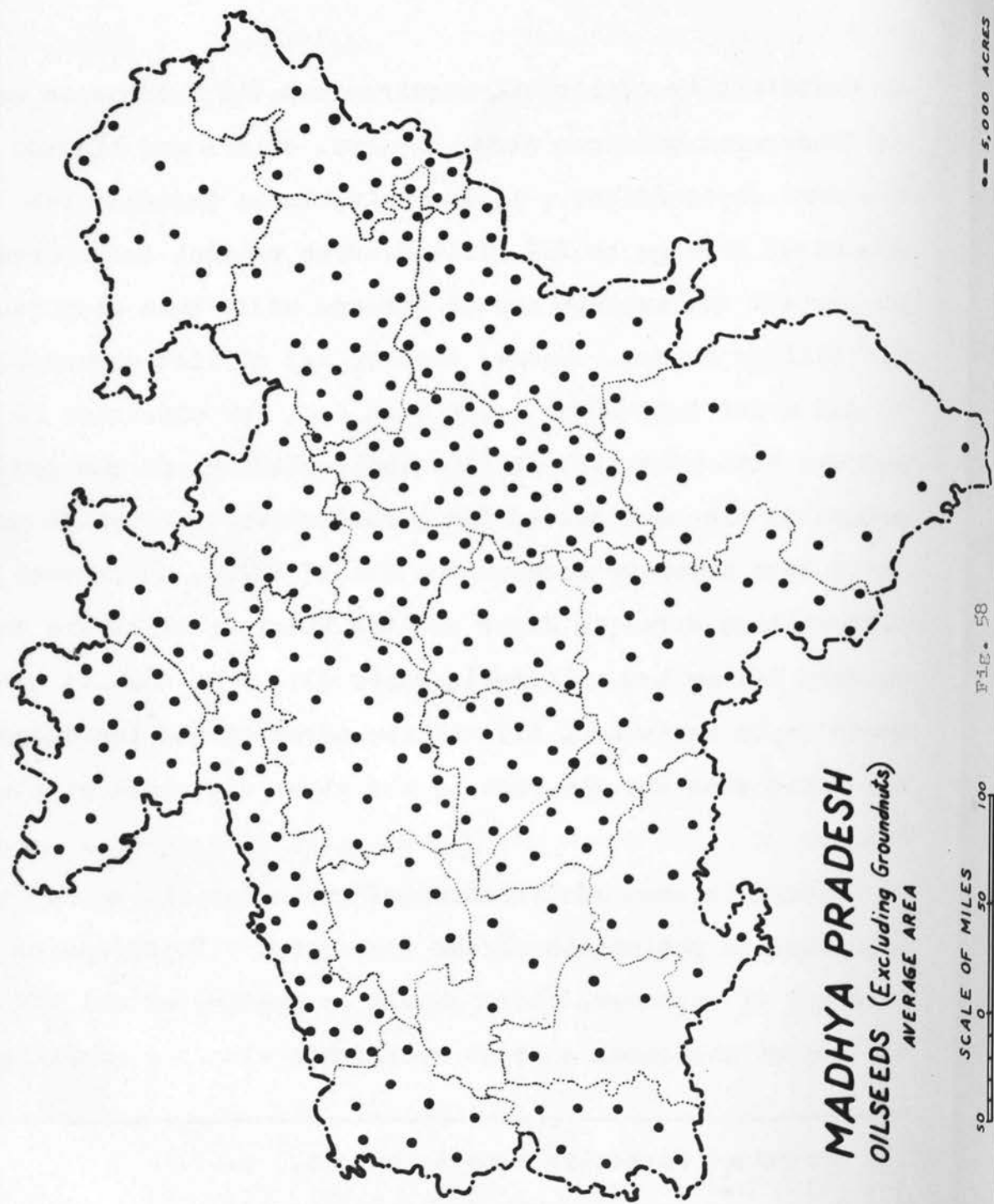
There is much adulteration of groundnut oil which is injurious to the health of the consumers. To safeguard the interest of consumers there should be grading of oil and sealing of the containers in accordance with the provisions

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(1) Groundnut Marketing Report, op.cit., p.45.

(2) Ibid, p.45.

(3) Tables of Agricultural Statistics for the year ending the 31st May, 1952, Nagpur 1955, p.1.



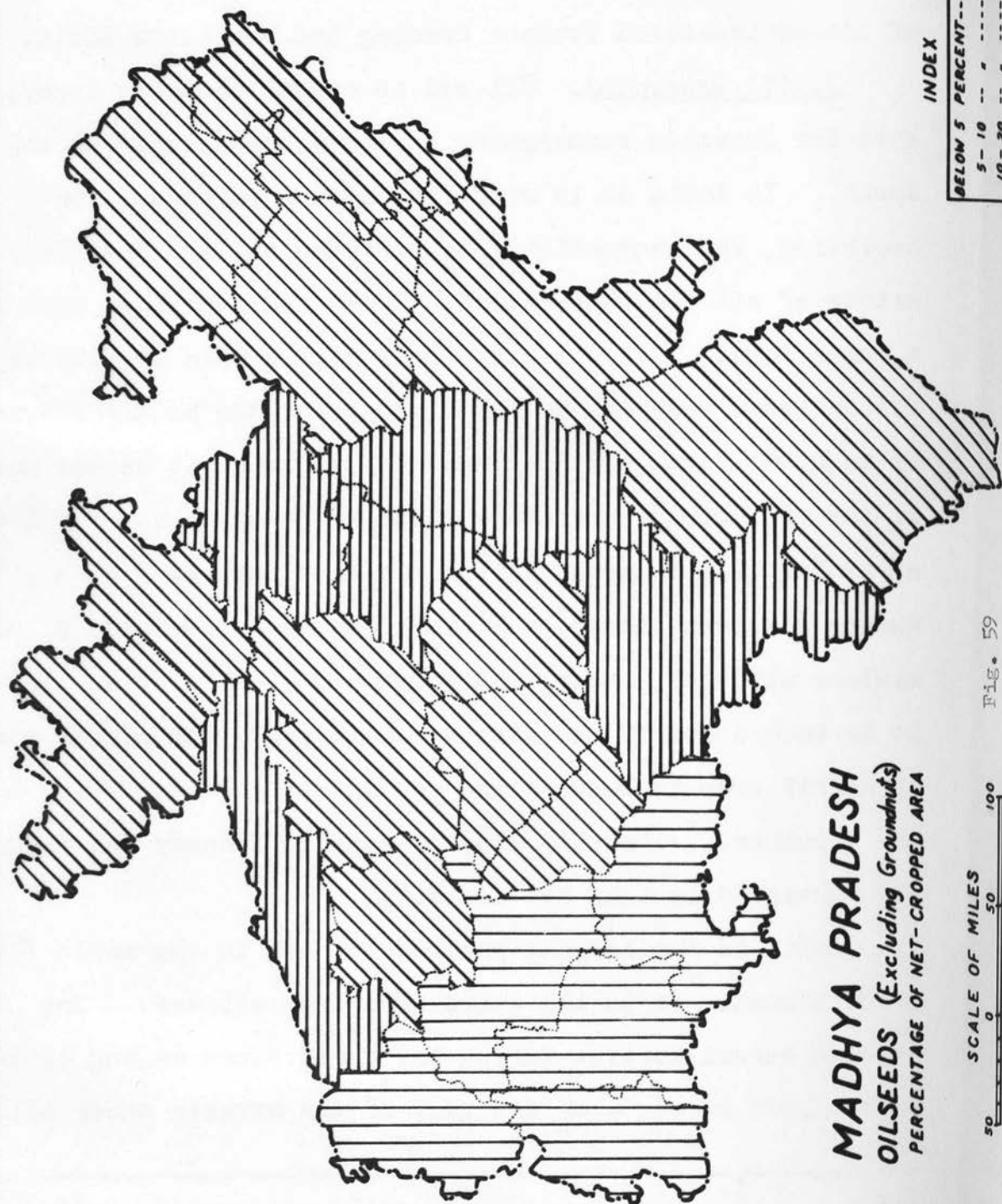
of the Agricultural Produce Grading and Marketing Act of 1937.

3. Til (sesamum). Til oil is one of the most important oils for domestic consumption in India, especially in the South. In India it is used for cooking purposes, for anointing, for conversion into perfumed oil and the lower grades of oil for soap-making. The seed itself is used as a human food. Til oil cake is an edible cake as well as cattle feed. It can be grown on plains and at elevations up to 4,000 feet. It is grown in the somewhat warmer part of the year with temperature about 70°F. or above. Til is a rainfed crop in areas having not less than 20 inches of rain during the crop season. It is grown as a pure crop or as a mixture with tur, arhar, the kodon and other crops. In M.P. it is both a kharif and also a rabi crop. The sowing period of kharif crop is between May and August and harvesting August and December. The rabi crop is sown in January and February and harvested between May and July.

India is the largest producer of til in the world (1). In this State, it is the third important oilseed. The average annual acreage during the three years ending 1949-50 was 415,978 acres - or 5.9 p.c. of the acreage under all

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(1) Estimates of Area and Production, op.cit., p.xviii.



**MADHYA PRADESH**  
**OILSEEDS (Excluding Groundnuts)**  
**PERCENTAGE OF NET-CROPPED AREA**

SCALE OF MILES  
 50 0 50 100

Fig. 59

INDEX

BELOW 5 PERCENT--	5-10	10-20
Diagonal lines (top-left to bottom-right)	Diagonal lines (bottom-left to top-right)	Horizontal lines

seeds. In the beginning of the present century til was the most important oilseed in the State with 960,000 acres under this crop.(1) The change over is due to the expansion of linseed and groundnut acreage. In the State the main growing districts of til are Chanda, Chhindwara, Hoshangabad, Nimar, Raigarh, Sagar and Yeotmal. About 67 p.c. of the average annual acreage during the three years ending 1949-50 was from these districts (279,685 acres out of 415,970 acres) (2).

The average yield per acre is low and in all India it is fifth. The estimated average yield per acre for the quinquennium ending 1952-53 was 162 lbs.(3). The State Agricultural Department is making trials to evolve high yielding hybrid strains for Kharif and rabi til crops as various Reports of the State Agriculture Department mention. The Estimated annual production of til during the quinquennium ending 1952-53 was about 32,000 tons.(4)

The future of this crop, at least in this State, does not seem bright in competition with groundnut and linseed. Still there will always be some demand for edible purposes and its oil in the preparation of perfumery and hair oil.

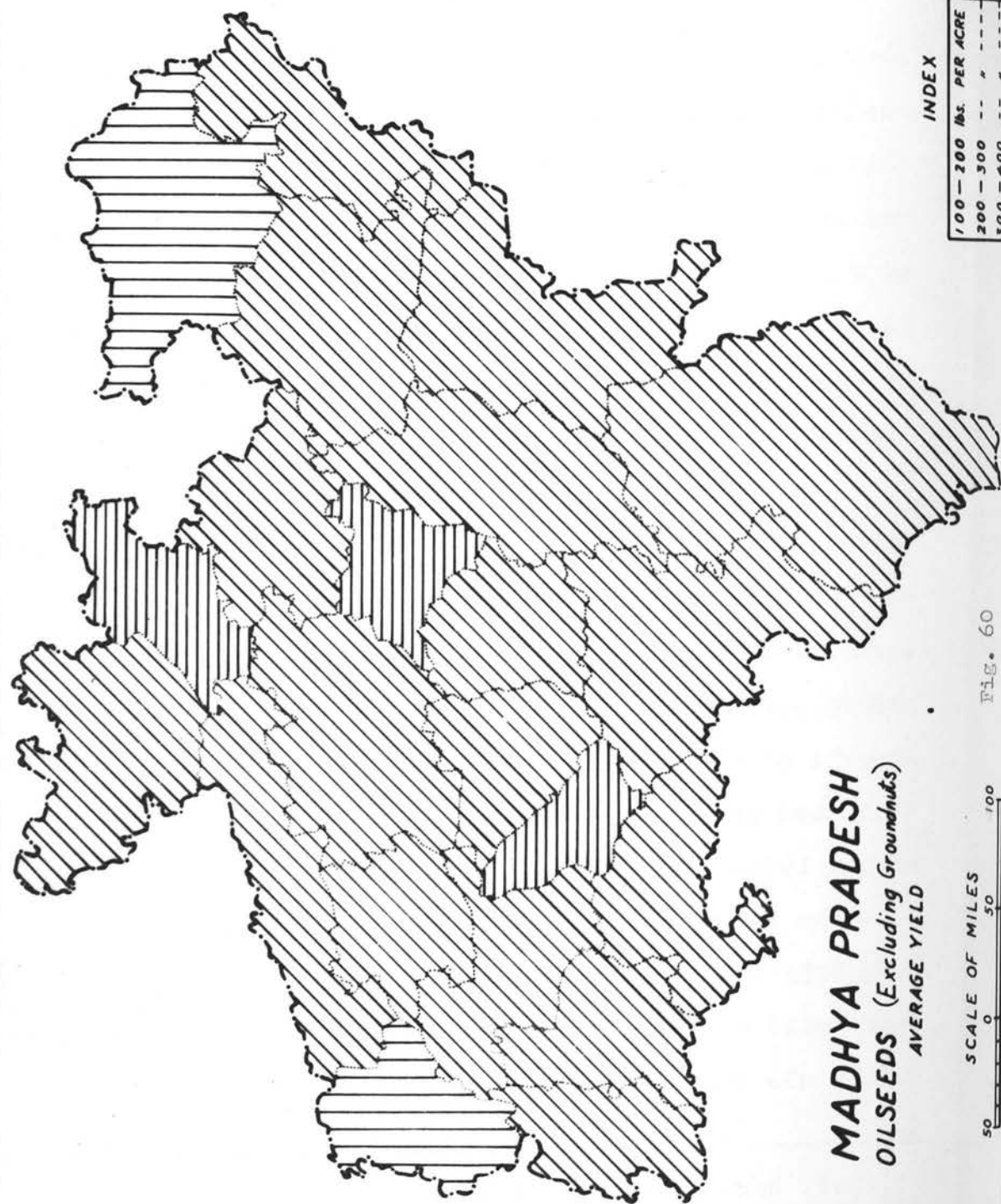
(1) C.P. Gazetteer, op.cit., p.41.

(2) Agricultural Statistics, op.cit., pp.244 and 250.

(3) Estimates of Area and Production, op.cit., p.64.

(4) Ibid, p.27.





**MADHYA PRADESH**  
**OILSEEDS (Excluding Groundnuts)**  
**AVERAGE YIELD**

SCALE OF MILES  
 50 0 50 100

Fig. 60

INDEX

100 — 200 lbs. PER ACRE	100 — 200
200 — 300 — "	200 — 300
300 — 400 — "	300 — 400

4. Rapeseed and Mustard. This includes three oilseeds of the crucifer family, viz., sarson (colza), toria (rapeseed) and rai (mustard). The seed is used for edible purposes, cattle feed and for toilet purposes. The oil is consumed mainly as edible oil, and some is utilized for lighting purposes and in the manufacture of soft soap. The cake of it is mainly for cattle and some for manure. Besides internal consumption, the oilseed, the oil and the cake are important items of export to foreign countries. In foreign countries the rape oil is mainly refined for use as a lubricant for "quenching" steel plates as "blown" rape oil. The main uses of mustard oil in foreign countries are seasoning for meat and table purposes.

Being essentially the oilseeds of Northern India, not much is grown in the south. This group of oilseeds requires fertile aluvial soil with comparatively dry winters. These are rabi crops, sown and harvested along with rabi foodgrains of wheat, barley and gram. Mostly they are grown as a mixed crop with rabi foodgrains. Among the major producing States of India, M.P. is seventh and the last. This State occupies 8.4 p.c. of the total Indian acreage under Rape and Mustard (1). In M.P., it is the fourth important oilseed according to acreage. The annual average acreage during the

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(1) Agricultural Statistics, op.cit., p.xlix.

three years ending 1949-50, was 165,223 acres or 5.9 p.c. of the total average acreage under all oilseeds (1). This group of oils is cultivated in every district of the State, from one acre in Nagpur and Nimar (1949-50) or 47,909 acres in the Bastar district (1949-50). But the main growing districts are Bastar, Bilaspur, Mandla, Raigarh and Surguja. These Districts contributed on an average for the three years ending 1949-50, 142,401 acres out of the average total of 165,223 acres or 86.2 p.c. (2).

Though last in acreage, M.P. was third in yield per acre among the Indian States. The estimated average yield per acre during the quinquennium ending 1952-53 was 385 lbs.(3).

The future of this group of oil is not very bright in this State as linseed and <sup>groundnuts</sup> ~~grounds~~ are more suited to the climate, soil and agricultural pattern of the State.

Fibre Crops. Of the fibre crops, cotton and sann hemp are mainly grown in this State. The average annual acreage and percentage of all fibre crops during the three years ending 1949-50 are given below.(4)

(1) Agricultural Statistics, op.cit., p.250.

(2) Ibid, pp.244 and 250.

(3) Estimates of Area and Production, p.64.

(4) Agricultural Statistics, op.cit., p.251.

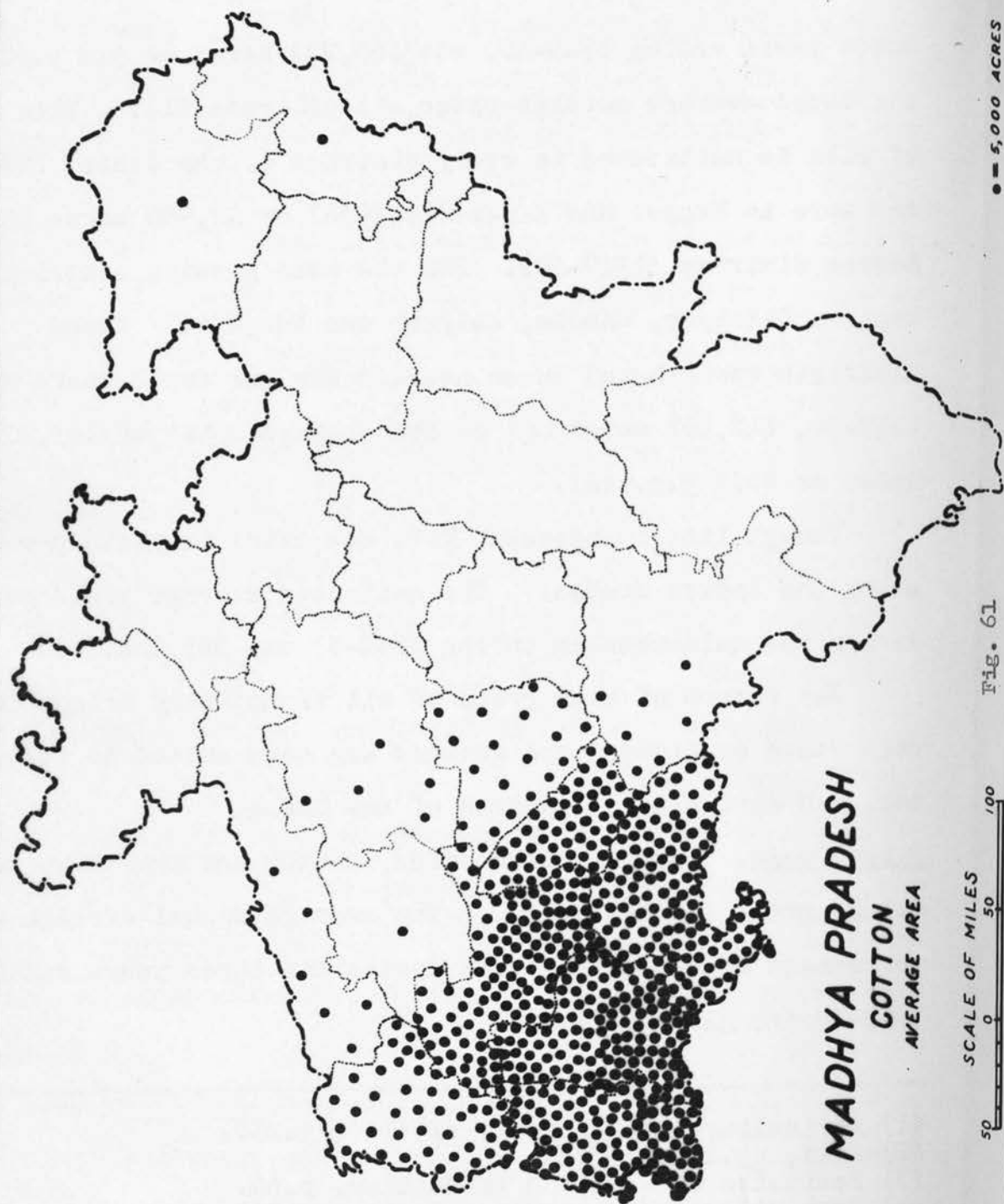


Fig. 61

Table No.29. Showing average acreage and percentage of the fibre crops grown in M.P.

<u>Crop</u>	<u>Average Area (in acres)</u>	<u>Percentage of all fibre crops</u>
1. Cotton	2,927,485	96.4
2. Sann hemp	85,379	2.8
3. Others	23,777	0.8
Total	3,036,641	100.0

Cotton (Fig.61-63). Besides being important for its fibres for clothing and its mixture with other fibres, cotton provides seeds of great commercial importance. The shell or hull of the seeds is used as cattle feed or as fuel and the oil is extracted from its kernels, which is converted into vegetable 'ghee' (clarified butter) and is known as cotogem. The outer fuff or fuzz of the seed is used for felting xylose, rayon, stuffing, etc. The oilcake is used as cattle feed.

From the point of view of acreage, India is second in the world at present, following the U.S.A. But in cotton production it is third, U.S.A. being the first, and the U.S.S.R. second (1). India had 23.7 p.c. of the acreage and 11.5 p.c. of the production of the world in 1954-55. In point of acreage and production Madhya Pradesh was second among the

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(1) Indian Central Cotton Committee (I.C.C.C.), Thirty-fourth Annual Report 1955 (No imprint), n.d., p.9.

Indian States in 1952-53. With 3,386,000 acres it accounted for 21.6 p.c. of the total cotton acreage of India. Its 625,000 bales (392 lbs. per bale) made 20.5 p.c. of the total Indian production (1) (Fig.61). The main cotton growing districts of the State, for reasons given below, are Akola, Amravati, Buldana, Yeotmal, Nagpur, Nimar and Wardha. These districts contributed on an annual average for three years ending 1949-50, 2,823,878 acres out of the average total cotton acreage of 2,927,485 acres of the State - about 96.4%(2).

The history of cotton cultivation in this State during the last 50 years can be divided into four periods. During the first period, from 1901-2 to 1929-30, there was a gradual expansion in acreage. From about 2.8 million acres it reached the maximum of 5.4 million acres in 1925-26. This was the period of remunerative prices of cotton and generally favourable climatic conditions for its cultivation. The second period, 1930-31 to 1949-50, was the period of gradual shrinkage in acreage. This was due to the low price of cotton and the nature of the seasons. In the third period, 1943-44 to 1946-47, there was further shrinkage in acreage due to the Government policy of encouraging diversion of

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(1) Estimates of Area and Production, op.cit., pp.xxi and xxii.

(2) Agricultural Statistics, op.cit., pp.245 and 251.



cotton area to food crops. The fourth period begins from 1947-48. Since then the Government has had to change its policy in the light of the Partition of India and the consequent transference of considerable cotton areas to Pakistan, leaving Indian mills to depend for a part of their requirement on imports of cotton. Since then efforts have been made to increase the cotton acreage. Since 1950-51, there has been a rapid expansion in cotton acreage and production in this State, which can be visualized from the table below (1).

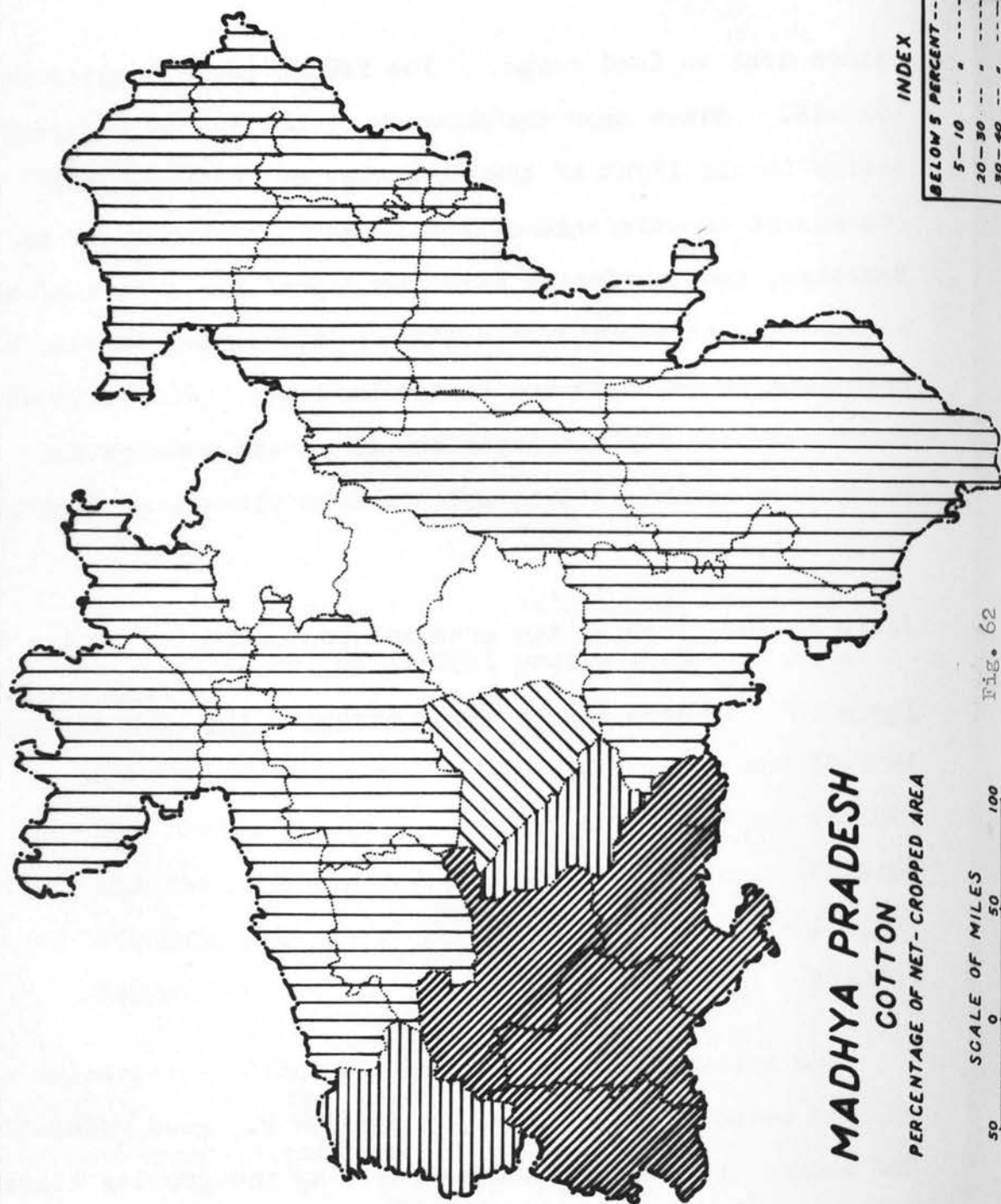
Table No.30. Showing the area and production of cotton in M.P. during 1950-51 to 1954-55.

<u>Years</u>	<u>Area (in thousand acres)</u>	<u>Production (in thousand bale)</u>
1950-51	2,776	510
1951-52	3,297	780
1952-53	3,544	653
1953-54	3,821	678
1954-55	3,847	663

The suitable conditions for the cotton cultivation are uniform temperature between 70° and 90° F., good rainfall at the sowing time and at intervals during the growing stages,

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(1) I.C.C.C., op.cit., p.117.



# **MADHYA PRADESH** **COTTON** PERCENTAGE OF NET-CROPPED AREA

SCALE OF MILES  
 50 0 50 100

INDEX

BELOW 5 PERCENT	5-10	10-20	20-30	30-40
[Horizontal lines]	[Diagonal lines (top-left to bottom-right)]	[Diagonal lines (bottom-left to top-right)]	[Cross-hatch]	[Dense cross-hatch]

Fig. 62

high temperature with clear skies at the ripening and boll-bursting stages and black loamy soils, alluvial sandy soils or mixed red and black soils. It is not the amount of rainfall but its distribution at proper time which assures its successful cultivation. M.P. possesses black clay soil which covers the districts of Akola, Amravati, Buldana, Wardha, Nagpur and Jabalpur. This is typical 'regur' or 'black cotton soil' which is suitable for the cultivation of cotton and jowar. The soil origin, soil, its condition, amount of rainfall and the location in the State are given in a tabular form below (1).

Table No.31. Showing the soil origin, type of soil, soil condition, rainfall and location in M.P.

<u>Soil origin</u>	<u>Soil</u>	<u>Soil condition</u>	<u>Rainfall</u>	<u>Location</u>
Trap.	1. Heavy clay loam	Fully mature	20" to 45".	Purna Valley, Wardha Valley, east to Nagpur, Tapi Valley.
	2. Medium loam	Varying stages of maturity	20" to 45".	On higher areas associated with the above.

In Madhya Pradesh cotton is sown from May to June, depending upon the break of the monsoon, and picking takes place from November to March. In Berar, if there is a good

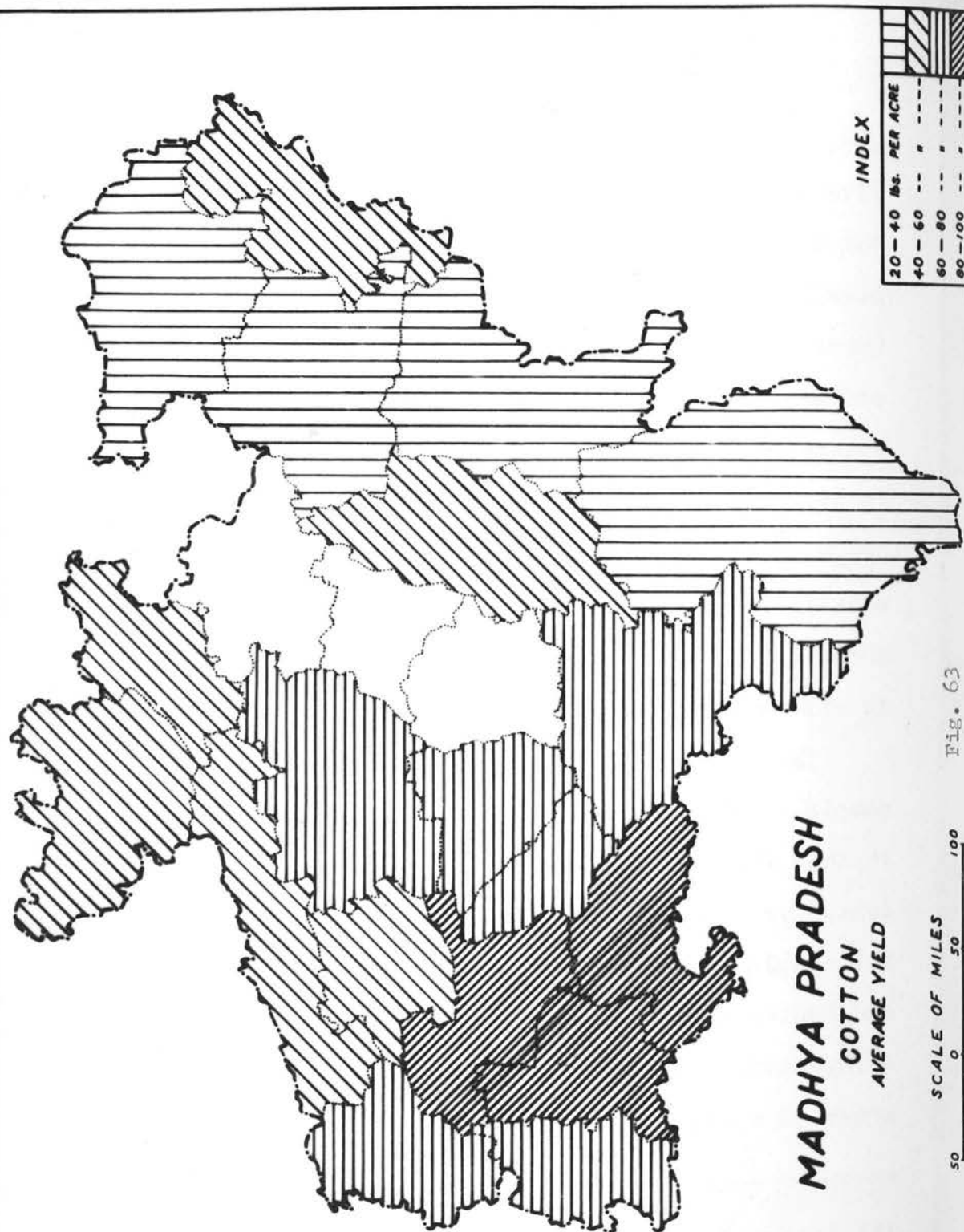
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(1) Progress of Agriculture, op.cit., p.21.

crop of cotton, the short staple variety can be picked "from five to seven pickings at intervals of fifteen or twenty days; but the .... superior varieties, ...., will not yield a second picking under a month, and the crop is generally exhausted in three pickings"(1). In this State it is grown as a dry crop and practically no cotton is irrigated. Mixed cropping with cotton is generally in vogue in India. It is mixed with ragi (a kind of millet), jowar, bajra, some kind of pulses and other crops. It is generally grown in rotation with jowar and sometimes with wheat in the third year. It is an exhaustive crop, and if sown twice successively the land must be turned up with plough and manured.

The quality of cotton is judged by the length of its staple. The greater the staple length the better the quality. In this State mostly short staple cotton is grown. In India cotton is graded into five types depending upon the length of its staple. Out of these, Super Long Staple (1" and above) and Medium Staple (below 13/16" and above 11/16") are not cultivated in this State. The other three varieties with areas of cultivation are shown below (2).

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- (1) Imperial Gazetteer of India, Provincial Series, Berar, Calcutta, 1909, p.27.
  - (2) Report on the Staple Length of the Indian Cotton Crop of 1954-55 Season, I.C.C.C., Bombay, n.d., pp.4-11.



INDEX

20-40	40-60	60-80	80-100
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**MADHYA PRADESH**  
COTTON  
AVERAGE YIELD

SCALE OF MILES



Fig. 63

Table No.32. Showing description of cotton and the districts of M.P. in which grown.

<u>Description cotton</u>	<u>Districts or Area in which grown</u>
1. Long Staple (7/8" to 31/32")	
a) p* Buri 0394	Nimar, Nagpur, Wardha and Yeotmal.
b) p Malini	Chikhli Taluka (Subdivisions) of Buldana district.
c) p H 420	Nimar, Nagpur, Wardha, Akola, Amravati and Yeotmal.
2. Superior Medium Staple (13/16" and 27/32")	
a) p Virnar	Buldana
b) M.P. Cambodia	Akola, Amravati, Yeotmal, Nimar and Wardha.
c) p Jarila	The whole of M.P.
3. Short Staple (11/16" and below)	
M.P. oomras	The entire M.P.

There has been a steady improvement in the quality of the crop during the period 1950-55. In 1950-51, the area under long staple was 23% of the total acreage which increased to 37% in 1954-55 (1).

The normal yield per acre of cotton (lint) of dry tract

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\* Note: The mark 'p' indicates the pure strain evolved by the Agriculture Department ~~and in 1955~~

(1) I.C.C.C. Report, op.cit., p.12.



is 60 to 100 lbs. (1) It is rainfed crop in Madhya Pradesh. The estimated yield per acre for the quinquennium ending 1953-54 for M.P. shows that even the maximum of the normal yield of 100 lbs. did not reach during those 5 years as is evident from the table given below. (2) (Fig. 63)

Table No. 33 Showing estimated yield per acre of cotton (lint) in lbs from 1948-49 to 1952-53 in M.P.

<u>1948-49</u>	<u>1949-50</u>	<u>1950-51</u>	<u>1951-52</u>	<u>1952-53</u>
45	41	72	93	72

Since 1923, all improvement work in connection with cotton development has been entrusted to the Indian Central Cotton Committee (I.C.C.C.) Within the limits of its resources and jurisdiction, it has done appreciable work. To increase the yield per acre, the I.C.C.C. has recommended the following measures: (3)

- "(1) Distribution of seed of improved varieties,
- "(2) Application of manure,
- "(3) Extension of irrigation facilities,
- "(4) Adoption of improved cultural practices, and
- "(5) Control of insect pests and diseases."

---

(1) I.C.C.C. Report, op. cit., p. 13  
 (2) Estimates of Area and Production, op. cit., p. 65  
 (3) I.C.C.C. Report, op. cit., p. 13

The State Agriculture Department took up the work of distribution of improved seeds in right earnest. The success achieved in this direction during the four years, 1951-52 to 1954-55, can be envisaged in the table given below. (1)

Table No. 34 Showing the quantities of improved seeds targeted for distribution and those actually distributed in M.P.

<u>Year</u>	<u>Quantity targeted in maunds (82 2/7 lbs per maund)</u>	<u>Quantity distributed in maunds</u>
1951-52	76,000	114,706
1952-53	114,750	114,750
1953-54	114,700	111,818
1954-55	114,700	123,267

The department also distributed fertilizers (ammonium sulphate) to the cultivators during the same period as shown in the table below. (2)

- 
- (1) I.C.C.C. Report, op. cit., p. 118  
 (2) Ibid, p. 119

(3) Indian Crop Calendar  
 pp. 8 and 9

Table No. 35 Showing the quantity of fertilizers targeted and distributed in M.P. during 1951-52 to 1954-55

<u>Year</u>	<u>Quantity targeted in tons</u>	<u>Quantity distributed in tons</u>
1951-52	2,500	2,445
1952-53	3,000	978
1953-54	6,000	6,000
1954-55	8,000	5,955

As far as extension of irrigation facilities are concerned it is a long range policy. The Government has incorporated certain major and minor irrigation projects and schemes in the Second Five Year Plan, which have been discussed in Chapter IV, Section B - Irrigation.

Some of the improved cultural practices, such as rotation of crops have been adopted by cultivators to a certain extent. Tur is intercropped with cotton in cotton growing tract and jowar, bajra, maize and cotton are substitutable crops in M.P. (1) But it will take a long time as cultivators are generally illiterate and unless they are educated and prejudices overcome, it is not possible to have great success in this direction.

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(1) Indian Crop Calendar, Ministry of Agriculture, Delhi 1950, pp. 8 and 9

(1) I.C.C.C. Report, op. cit., pp. 60 and 61

(2) Ibid, p. 61

The I.C.C.C. has launched several schemes in this State and the most important are discussed here.

(1) Scheme for breeding desi (indigenous) cotton in M.P.

This scheme came into operation in April, 1953. The objects are "(i) to isolate strains superior to H420 possessing a staple length of 13/16" to 14/16", a ginning outturn of 37% and a spinning capacity of 30's counts and (ii) to evolve, for the drier parts of M.P., a variety capable of yielding more than local jadi, with a ginning percentage of 40, staple length of 13/16" and capable of spinning over 25's counts." (1) The scheme is in progress. (1)

(2) Scheme for the study of Agronomy of long staple

American cotton in M.P. This came into operation on the 1st of March, 1954. The object is "to study the agronomy of long staple American cotton and to obtain the maximum yield." (2) The Department is conducting the experiment.

(3) Scheme for the distribution and marketing of jarila

cotton in M.P. This was a scheme to distribute jarila seed in the district of Buldana. It remained in operation from 1944 to 1955. In 1954-55, the estimated acreage under jarila in the Buldana district was 199,090 acres. (3) Later on the Department introduced M.5A cotton in place of jarila variety. It is getting popular. The variety 197-3 was "also introduced

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(1) I.C.C.C. Report, op. cit., pp. 60 and 61

(2) Ibid, p. 63

(3) Ibid, p. 82

side by side with Departmental Variety M. 5A, eliminating jarila variety which continued in its pure form up to 1954-55." (1)

(4) Scheme for distribution and marketing of H420 in M.P.

This scheme came into operation (2) in September, 1951. The object is "to produce pure seed, multiply it by stages for distribution to cultivators, so that H420 cotton grown in M.P. in general would be of a high standard of purity." (2) During the season 1954-55, the cotton acreage under improved strain H420 and other varieties in six important cotton growing districts of M.P. are given below. (3)

Table No. 36 Showing cotton acreage during 1954-55 in 6 important cotton growing districts of M.P. (4)

<u>District</u>	<u>Improved strain H420 Acres</u>	<u>Other varieties including local in acres</u>	<u>Total Area in Acres</u>
1. Akola	310,00	437,100	747,100
2. Amravati	320,000	460,400	780,400
3. Nagpur	36,000	153,400	189,400
4. Numar	70,000	251,500	321,500
5. Wardha	120,000	265,700	385,700
6. Yeotmal	348,000	291,500	639,500
G. Total	1,204,000	1,859,600	3,063,600

(1) I.C.C.C. Report, p. 83

(2) Ibid, p. 83

(3) Ibid, p. 84

(4) ~~Ibid, p. 84~~

Further it has been decided to put the whole of 3,063,600 acres under improved strains in these six districts - 2,723,000 acres under H420 and the rest under Buri strains. (1)

(5) Scheme for distribution and marketing of Buri 0394 cotton in M.P. The scheme came into operation on the 1st of April, 1953. The object is to "cover an area of 50,000 acres with pure departmental seed of Buri 0394 cotton in Nimar tract of Madhya Pradesh." (2)

Besides the above the Department distributed various improved varieties in different cotton tracts of the State in 1954-55. (3)

The target fixed for India under the First Five Year Plan for cotton acreage to be achieved by 1955-56 was 18 million acres which was exceeded by 0.3 million. (4) The efforts to increase the production of long staple cotton met with some significant success as "the proportion of these varieties had gone up from 17.5 per cent in 1948-49 to about 37 per cent in 1954-55." (5) During the Second Five Year Plan period (1955-56 to 1960-61) the schemes for the cotton development will continue the measures undertaken during the first five year plan such as

- 
- (1) I.C.C.C. Report, op. cit., p. 84
  - (2) Ibid, p. 85
  - (3) Ibid, p. 102
  - (4) Ibid, p. 1
  - (5) Second Five Year Plan, op. cit., p. 264



provision of hybrid seed, multiplication and distribution of improved seed and fertilizers and extension and propaganda among the cotton cultivators. An important feature of development under the second plan will be "the emphasis on increasing the production of long staple varieties particularly in the areas brought under major irrigation projects." (1) The target fixed under the Second Five Year Plan to be achieved by 1960-61 for the State is 3,750,000 acres in area and 780,000 bales in production. (2)

Other crops. These include codiment and spices, sugarcane, tobacco, fodder crops, fruits and vegetables, and miscellaneous crops. These crops cover only a small acreage and are distributed over different parts of the State. They are of local importance. Separate data for some of these crops are not available and the Agriculture Department of the Government of India has suggested "to the States to collect data for such crops separately....." (3)

The average annual acreage and percentage to the net cropped area during the three years ending 1949-50, are given below. (4)

- 
- (1) Second Five Year Plan, op. cit., p. 263
  - (2) I.C.C.C. Report, op. cit., p. 115
  - (3) Agricultural Statistics, op. cit., p. Liii
  - (4) Ibid, pp. 251-53

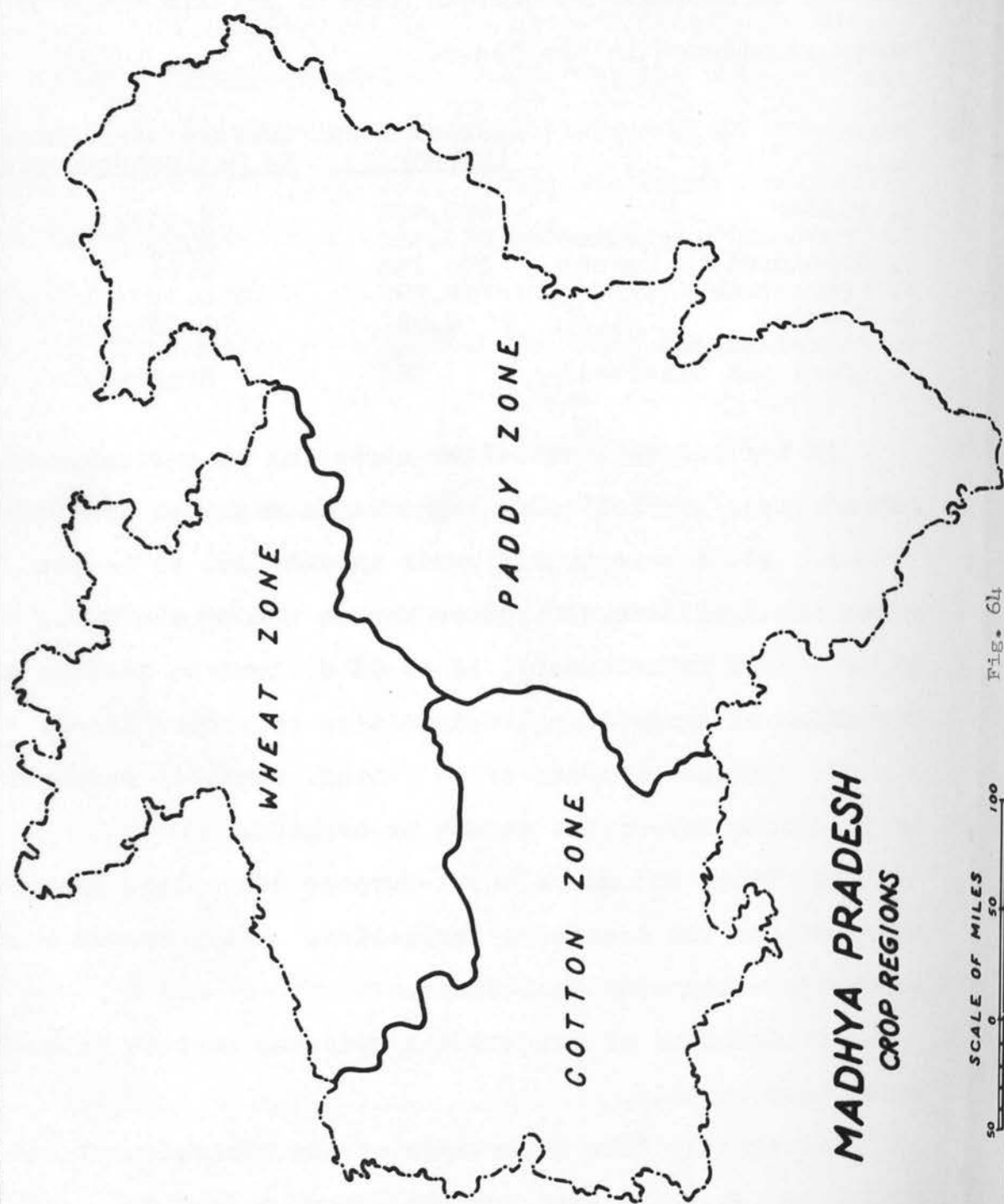
Table No. 37 Showing the average annual acreage and percentage to average net cropped area of certain crops of minor importance in the State.

<u>Crop</u>	<u>Average Area (in acres)</u>	<u>Average percentage to net cropped area</u>
1. Fodder	479,426	1.69
2. Fruits & Vegetables	213,400	0.75
3. Condiments & Spices	174,158	0.61
4. Sugar cane	54,899	0.19
5. Tobacco	8,551	0.03
6. Miscellaneous (food and non-food)	869	Negligible

In the interest of better marketing of agricultural commodities, the following suggestions might be considered.

1. All the important grain markets are to be put under the Agricultural Produce Market Act of the C.P., 1935. This is necessary, if it is desired to develop the marketing of agricultural commodities on proper lines.
2. An inspectorate of marketing, directly responsible to the State Government should be created.
3. There should be multi-purpose societies, growers' associations and consumers' societies. They should work in co-operation with each other.
4. Standard of weights and measures must be introduced compulsorily.

Considering "the importance of the agricultural industry communication facilities are still very defective. All



**MADHYA PRADESH**  
**CROP REGIONS**

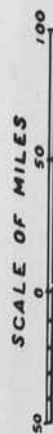


Fig. 64

the important wholesale markets are situated at railhead towns. These are generally district headquarters too and so there is also some metalled road passing through them; but producing areas are in many cases a good day's journey from these metalled roads, with a number of unbridged nalas and rivers intervening. On account of the poor roads the village merchants and itinerant traders occupy an important position in the marketing of produce."(1)

A considerable amount is also lost due to bad storage, bad handling in gunny bags, rats and rains. It is essential to have godowns which are lacking in the State.

Agricultural Zones. Agriculturally the State can be divided broadly into three zones, viz., cotton, wheat and paddy (Fig. 64). The Cotton Zone comprises the districts of Akola, Amravati, Buldana, Nagpur, Nimar, Wardha and Yeotmal. The Wheat Zone covers the districts of Betul, Chhindwara, Hoshangabad, Jabalpur, Mandla and Sagar. The district of Balaghat, Bastar, Bhandara, Bilaspur, Chanda, Durg, Raigarh, Raipur and Surguja lie in the Paddy Zone.

The cotton zone is generally found on flat-topped plateau and hills. The main geological formation is the Deccan Trap. Alluvium deposits in the river basins of

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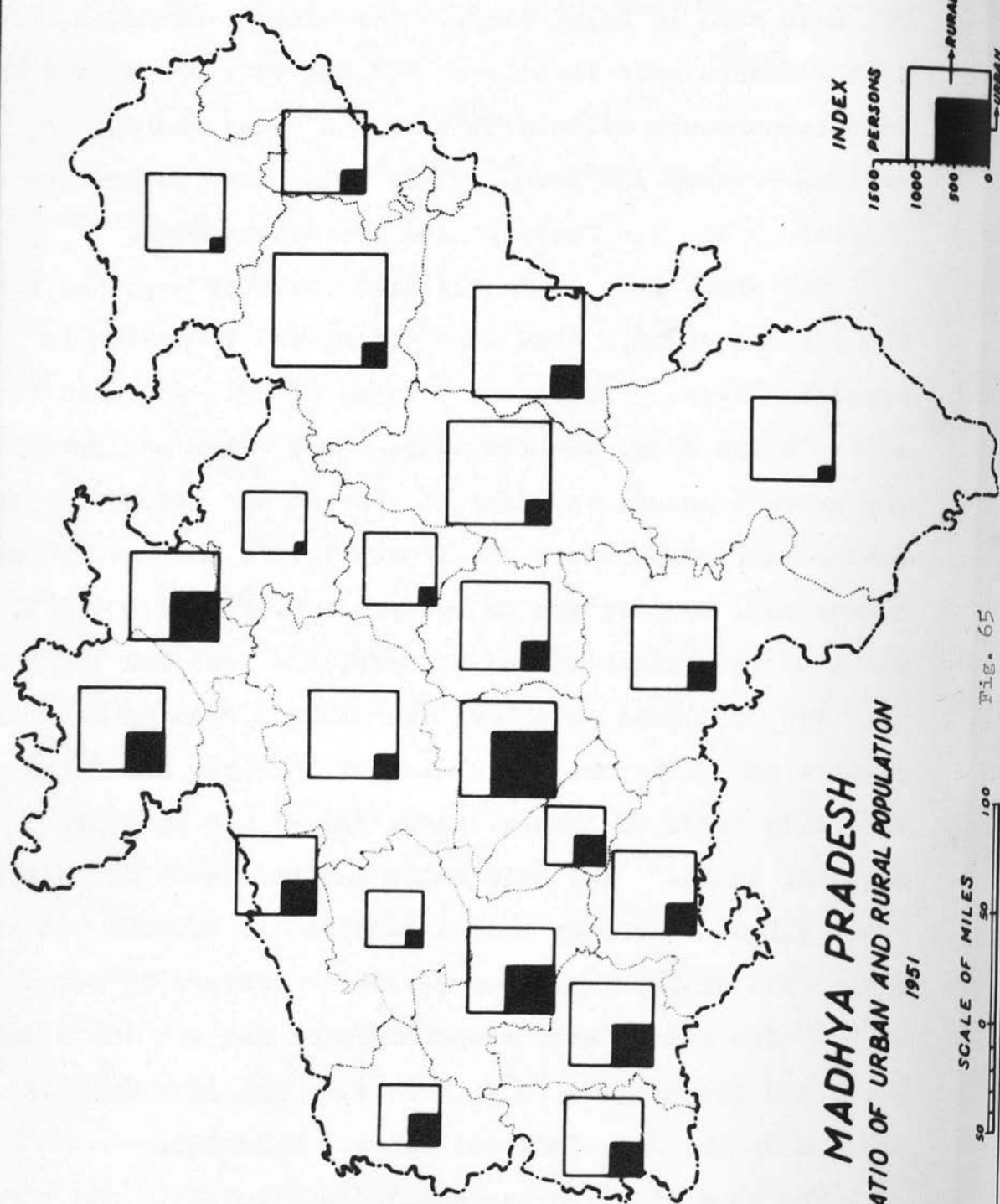
(1) Report of Marketing of Agricultural Commodities, No. 1, <sup>wheat</sup> Nagpur 1949, p.1.

Buldana, Akola and Amravati are also favoured by cotton. The main soil is balck clay. The average annual rainfall of the cotton zone is between 32" and 49", the winter maximum temperature between  $84^{\circ}\text{F}$  and  $86^{\circ}\text{F}$  and the summer maximum between  $108^{\circ}\text{F}$  and  $109^{\circ}\text{F}$ . The zone is drained by the Wardha and the Penganga and the tributaries.

The wheat zone is mostly hilly country together with the Narmada basin. The main geological formation is basaltic lavas. There are 4 types of soil found in this zone - black clay, shallow clay, heavy black and gravelly. The average annual rainfall is between 31" and 58". The winter max. temperature is between  $76.7^{\circ}\text{F}$  and  $84.8^{\circ}\text{F}$  and summer max. temperature is between  $103.6^{\circ}\text{F}$  and  $106.0^{\circ}\text{F}$ . The zone is drained by the Narmada, the Tapi and the Sonar.

The rice zone comprises the plateau area of Surguja, Raigarh and Bilaspur, the plains of Balaghat and Bhandara, the hilly tract of Chanda, Durg, and Bastar and the Mahanadi basin. The main soils are red sandy and black sandy soils. Average annual rainfall is between 43" and 69". The winter max. temperature is between  $75^{\circ}\text{F}$  and  $85^{\circ}\text{F}$ . The summer max. temperature is between  $101^{\circ}\text{F}$  and  $109^{\circ}\text{F}$  and the minimum  $75^{\circ}\text{F}$  to  $85^{\circ}\text{F}$ . The rice zone is drained by the Son, Godawari and the Mahanadi.

The population is unequally distributed in the three



**MADHYA PRADESH**  
**RATIO OF URBAN AND RURAL POPULATION**  
 1951



zones. The paddy zone has a little less than half of the population, i.e. 48 p.c., while the cotton zone has 28.6 p.c. and the wheat zone 23.4 p.c.. The table below gives the actual population and the percentage of population according to the census of 1951.

Table No. 38 Showing population distribution and the percentage in various agricultural zones of the State

<u>Zone</u>	<u>Population</u>	<u>Percentage</u>
Cotton	6,081,259	28.6
Wheat	4,966,914	23.4
Paddy	<u>10,199,360</u>	<u>48.0</u>
Total	21,247,533	100.0

The density of population is highest in the cotton zone (216 persons per square mile), followed by the paddy zone (150) and then the wheat zone (149). However, if the density is considered in relation to the average net cropped area of the zones, the situation is changed. The density per square mile of average net cropped area becomes highest in the paddy zone (546 persons) followed by the wheat zone (459) and the cotton zone (411) as is shown in the table below.

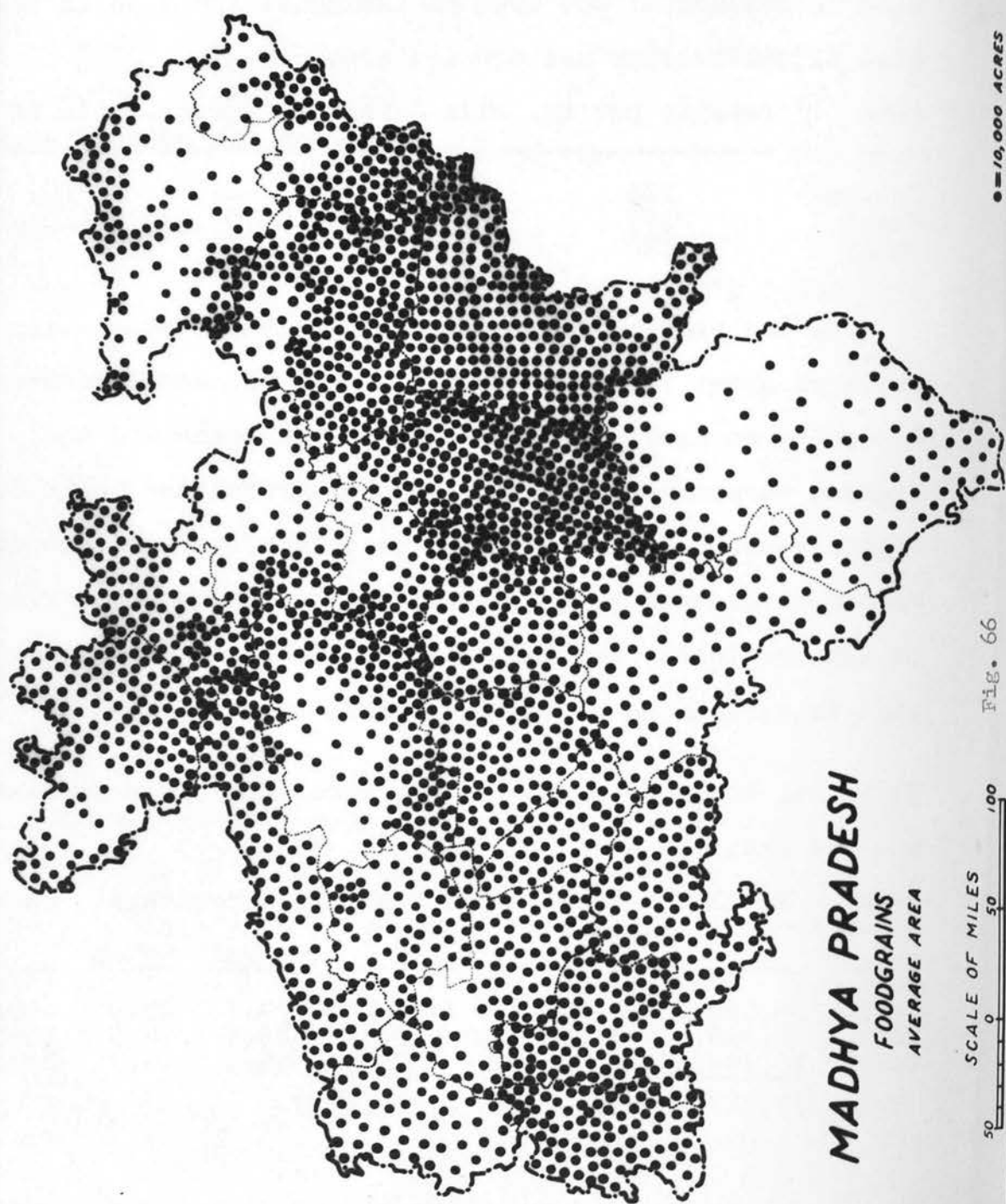
Table No. 39 Showing the density of population per square mile in respect of the area of the zones and also in respect of the average net cropped area.

Zone	Density per sq. mile	Density per sq. mile of <u>average net cropped area</u>
Cotton	216	411
Wheat	149	459
Paddy	150	546

As has been indicated, the agricultural population averages about 76% of the total. The highest percentage depending on agriculture is in the paddy zone and the highest percentage depending on non-agriculture is in the cotton zone. In other words the cotton zone is more advanced, industrially and commercially, than the other zones. It also reflects from the ratio of rural and urban population in various zones as is shown in the table below.

Table No. 40 Showing the total, rural and urban population and the ratio .

Zone	Total	Rural	Urban	Percentage of <u>Rural</u>	Percentage of <u>Urban</u>	Total
Cotton	6,081,259	4,507,251	1,574,008	74.1	25.9	100.0
Wheat	4,966,914	4,246,427	720,487	85.5	14.5	100.0
Paddy	<u>10,199,360</u>	<u>9,616,516</u>	<u>582,844</u>	94.3	15.7	100.0
Total	21,247,533	18,370,194	2,877,339			



**MADHYA PRADESH**  
**FOODGRAINS**  
**AVERAGE AREA**

SCALE OF MILES  
50 0 50 100

Fig. 66

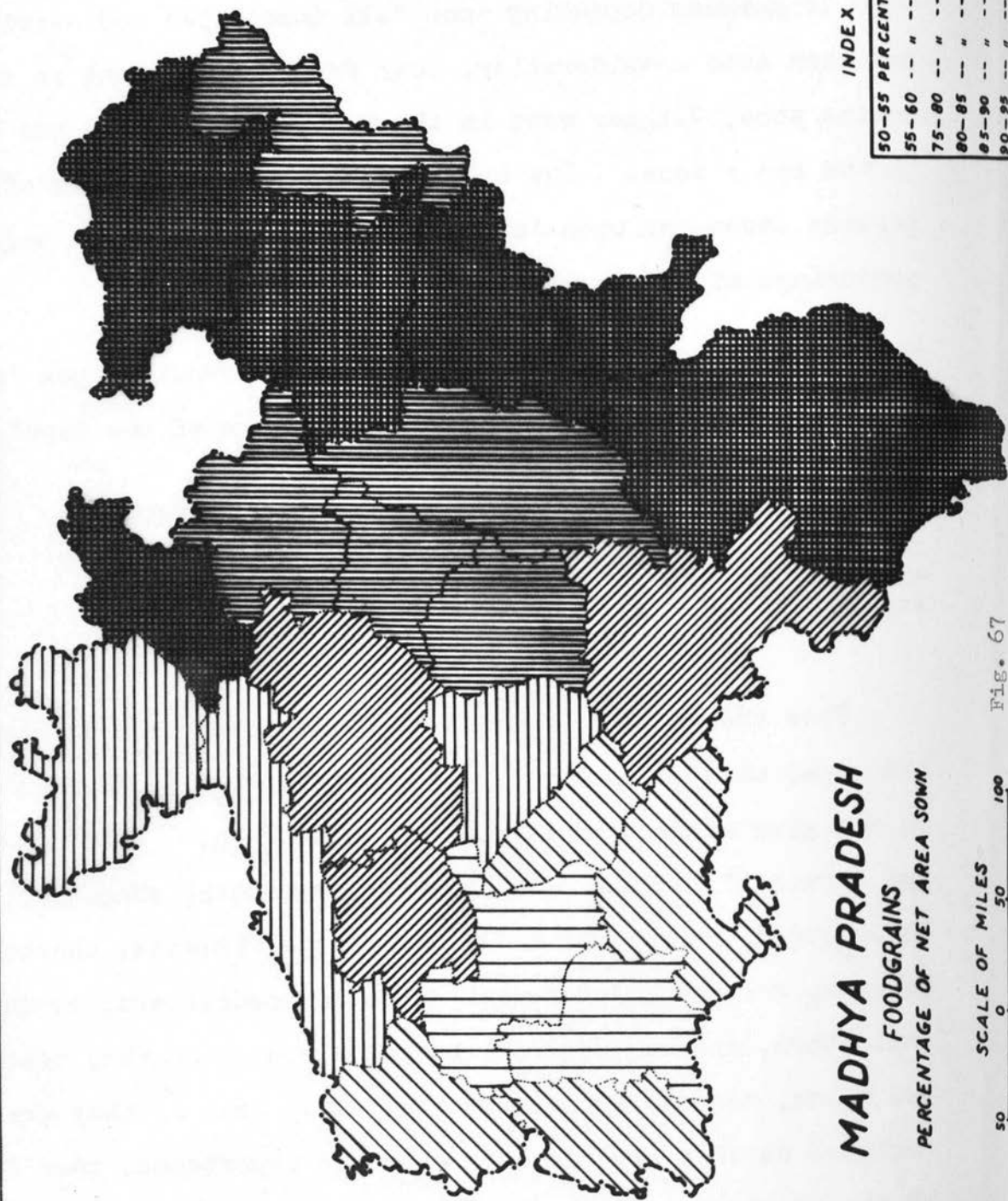
● = 10,000 ACRES

If persons depending upon "all industries and services" is taken into consideration, they form 8.8 per cent in the cotton zone, 9.1 per cent in the wheat zone and 5.4 per cent in the paddy zone. The table below gives the number of persons dependent upon 'all industries and services' and the percentage of the population of various zones.

Table No. 41 Showing number of persons depending upon 'all industries and services' and the percentage of the population.

<u>Zone</u>	<u>Total</u>	<u>Percentage</u>
Cotton	536,081	8.8
Wheat	450,912	9.1
Paddy	554,265	5.4
Total	1,541,265	

From the above it emerges that the wheat zone is more developed than the other two. But these two employment figures do not give correct picture of the situation. 'All industries and services' include 'bidi' makers, herdsmen, shepherds, bee-keepers, rearers of small animals and insects, charcoal burners, collectors of forest produce, woodcutters, cowdung collectors, and cowdung makers, gatherers of chanks, pearls, sea weeds, sea shells and sponges, etc. But if they are excluded as they are of minor economic importance, then 8.2% of the population of the cotton zone is seen to depend upon non-agriculture class, 7.8% wheat zone and <sup>4.1 %</sup> ~~4.1 %~~ paddy zone as is shown in the table below.



**MADHYA PRADESH**  
**FOODGRAINS**  
**PERCENTAGE OF NET AREA SOWN**

SCALE OF MILES  
 50 0 50 100

INDEX

PERCENT	INDEX
50-55	Horizontal lines
55-60	Diagonal lines (top-left to bottom-right)
60-65	Diagonal lines (bottom-left to top-right)
65-70	Cross-hatching
70-75	Dense cross-hatching
75-80	Very dense cross-hatching
80-85	Extremely dense cross-hatching
85-90	Solid black
90-95	Solid black

Fig. 67

Table No. 42 Showing the number of persons depending upon 'all industries and services' excluding mentioned above and the percentage to the zonal population.

<u>Zone.</u>	<u>Total</u>	<u>Percentage.</u>
Cotton	497,669	8.2.
Wheat	387,327	7.8.
Paddy	<u>423,065</u>	4.1.
Total	1,308,361	

To sum up the cotton Zone is more developed industrially and commercially than the other two, and the Wheat Zone is more than the Paddy Zone.

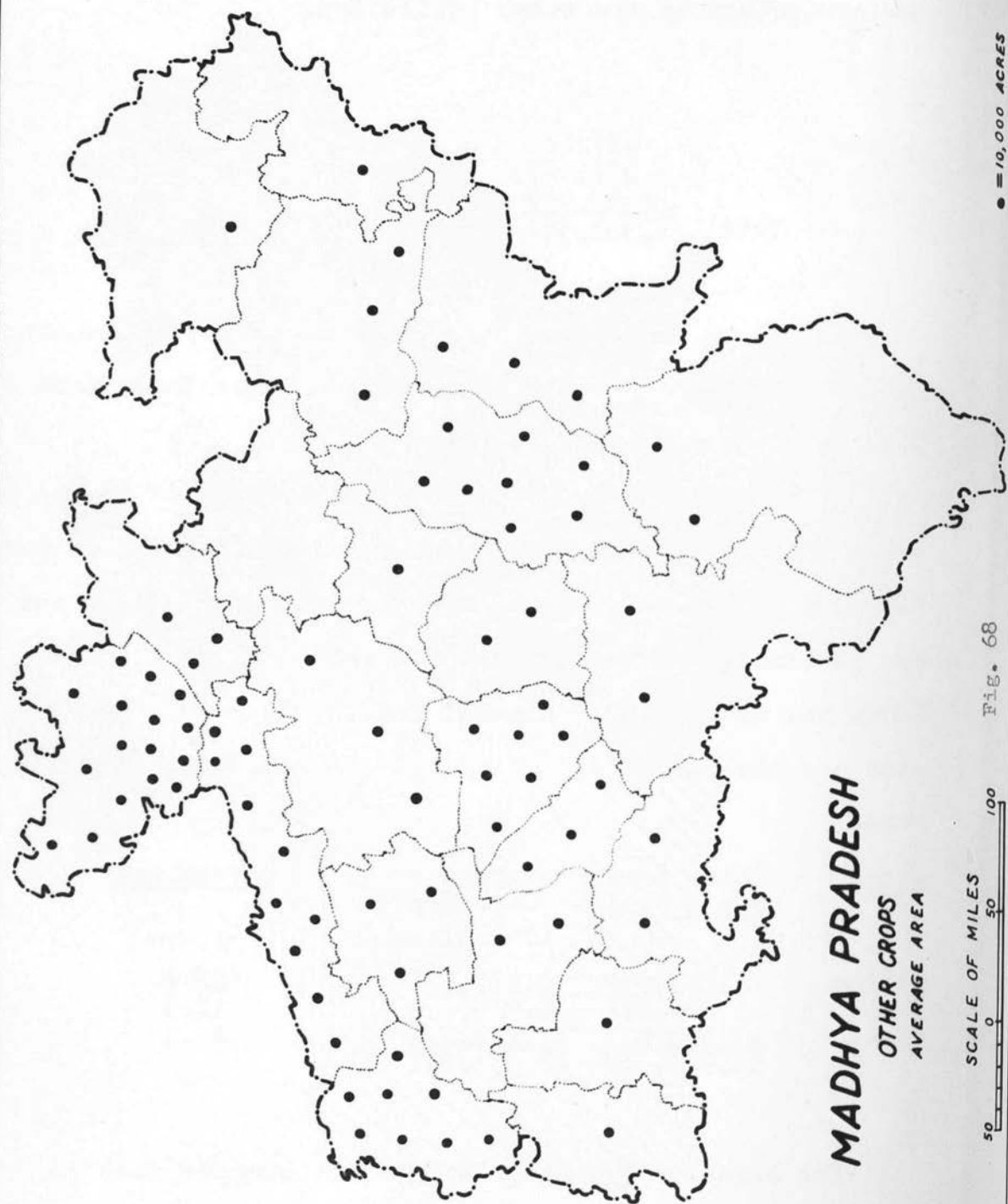
Of the total area of about 83 million acres of the State, about 28.4 million acres are under cultivation - 34.2 p.c. (Fig 26). The total area, average net cropped area and the percentage of the net cropped are shown in the table below.

Table No. 43 Showing the total area, average net cropped area and the percentage of the net cropped area of various zones.

<u>Zone</u>	<u>Total area (in acres)</u>	<u>Average net cropped area (acres)</u>	<u>Percentage</u>
Cotton	18,015,539	9,481,074	52.6
Wheat	21,403,894	6,918,859	32.3
Paddy	<u>43,563,677</u>	<u>11,953,158</u>	27.4
	82,983,110	28,353,091	

The highest percentage of the net cropped area is in the





## MADHYA PRADESH

OTHER CROPS  
AVERAGE AREA

SCALE OF MILES  
50 0 50 100

Fig. 68

● = 10,000 ACRES

Cotton Zone (52.6 p.c.), the second is the Wheat Zone (32.3) and the last is Paddy Zone (27.4).

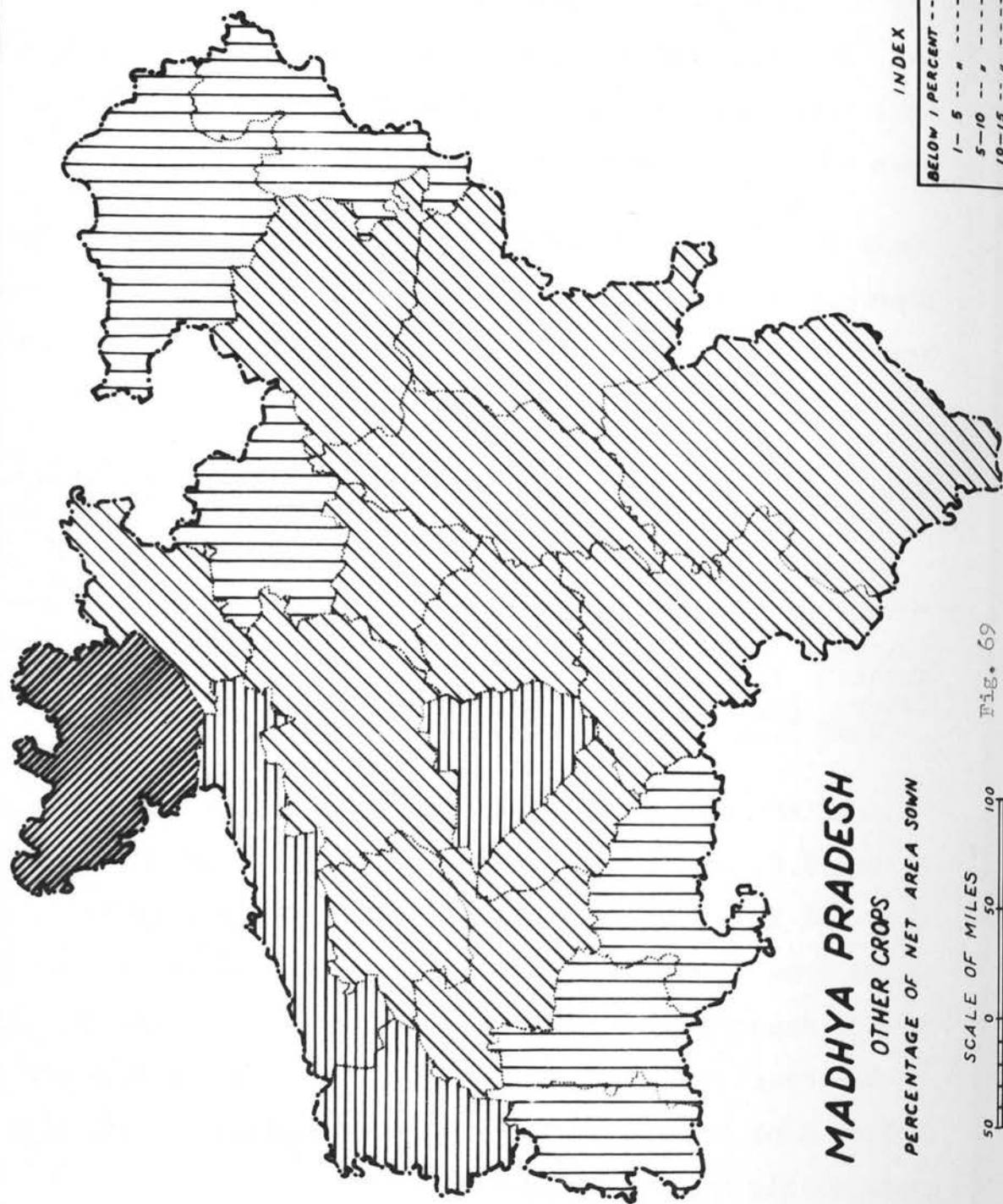
The table below gives the average total area sown, sown more than once, net cropped area of the percentage of the area sown more than once to net cropped area.

Table No. 44 Showing average total area sown, average area sown more than once, average net cropped area and the percentage of the area sown more than once to net cropped area (Fig. 70 and 71).

Zone	Average Total Area Sown	Average Area Sown more than once	Average Net Cropped Area	Percentage of sown more than once to net cropped area
Cotton	9,609,186	128,112	9,481,074	1.4
Wheat	7,501,234	582,375	6,918,859	8.4
Paddy	14,724,992	2,771,834	11,953,158	23.1.
Total	31,835,412	3,482,321	28,353,091	

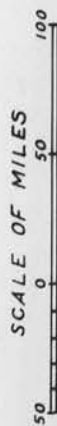
Of the average area of about 3.5 million acres sown, about 79.6 p.c. is in the Paddy Zone, 16.7 p.c. in the Wheat Zone and 3.7 p.c. in the Paddy Zone, The reason for this large area in the Paddy Zone is that agriculture in the State mostly depends upon rainfall. In connection with the climate, it has been shown that this area has higher rainfall and the Cotton Zone the lowest. Hence, availability of water is responsible for this situation.

The average acreage under principal crops in various



# MADHYA PRADESH

OTHER CROPS  
PERCENTAGE OF NET AREA SOWN



INDEX

BELOW 1 PERCENT	1-5	5-10	10-15
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Fig. 69

zones are shown in the table below.

Table No. 45 Showing average acreage under principal crop in various zones. (Figures in acres.)

<u>Zone</u>	<u>Rice</u>	<u>Wheat</u>	<u>Jowar</u>	<u>Pulses</u>	<u>Oilseeds</u>	<u>Cotton</u>
Cotton	1176830	450535	3531958	1260627	884080	2820545
Wheat	855660	1329485	868650	1996147	760349	59214
Paddy	7704432	298148	469216	3168652	1153003	47726
Total	8736922	2078168	4869824	6425426	2797432	2927485

The table below gives the percentage distribution of the principal crops in various zones.

Table No. 46 Showing percentage distribution of principal crops in various zones.

<u>Zone</u>	<u>Rice</u>	<u>Wheat</u>	<u>Jowar</u>	<u>Pulses</u>	<u>Oilseeds</u>	<u>Cotton</u>
Cotton	2.0	21.7	72.5	19.6	31.6	96.4
Wheat	9.8	64.0	17.8	31.1	27.2	2.0
Paddy	88.2	14.3	9.7	49.3	41.2	1.6
Total	100.0	100.0	100.0	100.0	100.0	100.0

If Statewise distribution of principal crops is taken into consideration the importance in descending order of acreage in various zones would be:

Cotton Zone - Cotton, Jowar, Oilseeds, Wheat, Pulses and Rice  
 Wheat Zone - Wheat, Pulses, Oilseeds, Jowar, Rice and Cotton  
 Paddy Zone - Rice, Pulses, Oilseeds, Wheat, Jowar and cotton.

The zonal distribution of percentage to average net

cropped area is given in the table below.

Table No. 47 Showing percentage of the average net cropped area under principal crops in various zones.

<u>Zone</u>	<u>Rice</u>	<u>Wheat</u>	<u>Jowar</u>	<u>Pulses</u>	<u>Oilseeds</u>	<u>Cotton</u>	<u>Total</u>
Cotton	1.9	4.8	37.3	13.3	9.3	29.7	96.3
Wheat	12.4	19.2	12.6	28.9	11.0	0.9	85.0
Paddy	64.5	2.5	3.9	26.5	9.6	0.4	107.2

Accordingly the acreage decreases in the following order in various zones:

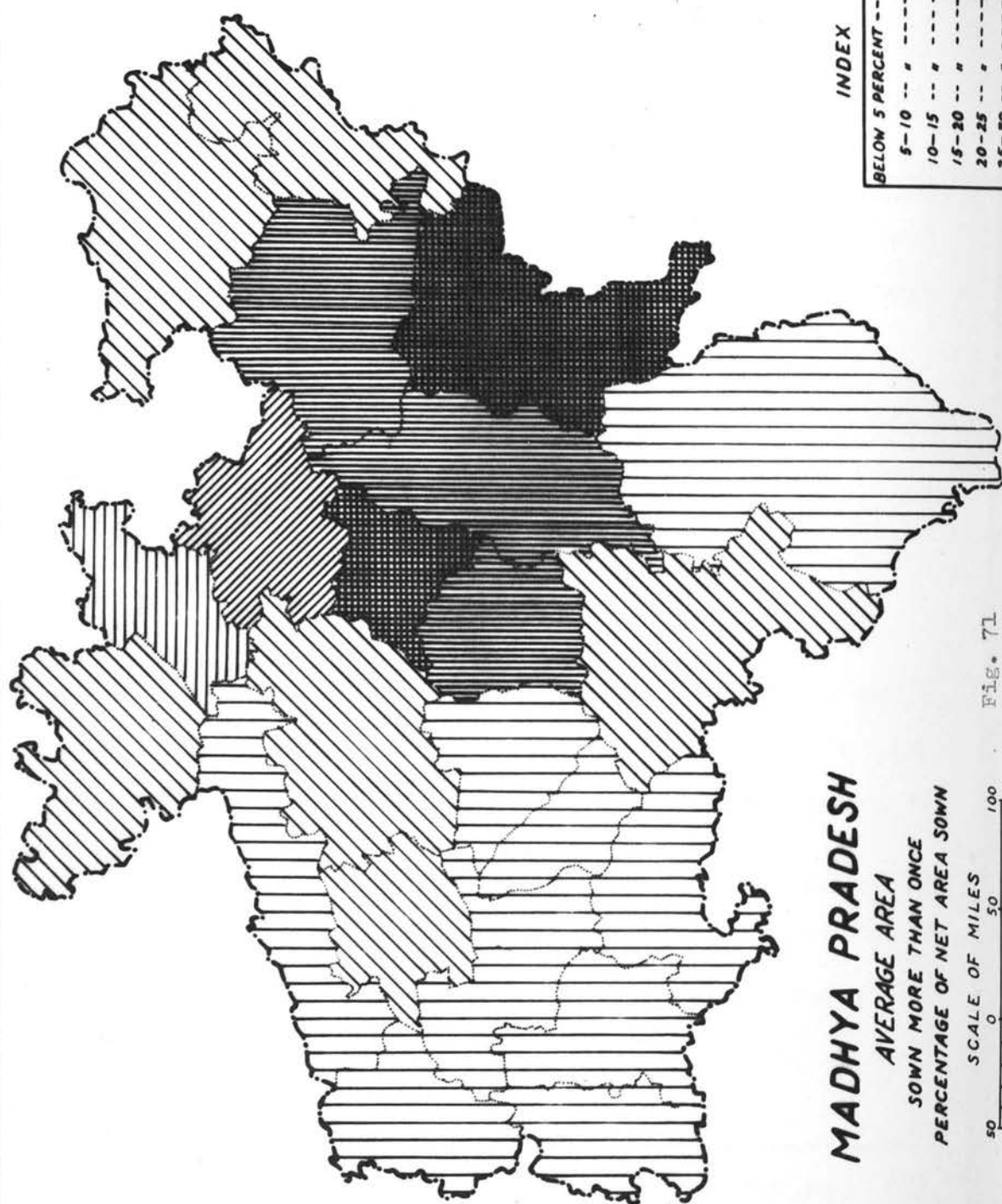
Cotton - Jowar, Cotton, Pulses, Wheat and Rice  
 Wheat - Pulses, Wheat, Jowar, Rice, Oilseeds and Cotton  
 Paddy - Rice, Pulses, Oilseeds, Jowar, Wheat and Cotton

The three zones can be further sub-divided into 7 sub-zones according to the predominance of kharif or rabi crops grown soil conditions, rainfall and location, and divergence in cropping pattern as given in the table below. (1)

Table No. 48 Showing the crop zones, subzones, soil origin, type of soil, soil condition, rainfall, location and divergence in cropping pattern.

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(1) Progress of Agriculture in M.P., op.cit., p.21.



INDEX

BELOW 5 PERCENT	5-10	10-15	15-20	20-25	25-30
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# **MADHYA PRADESH**

AVERAGE AREA

SOWN MORE THAN ONCE

PERCENTAGE OF NET AREA SOWN

SCALE OF MILES

50 0 50 100

Fig. 71



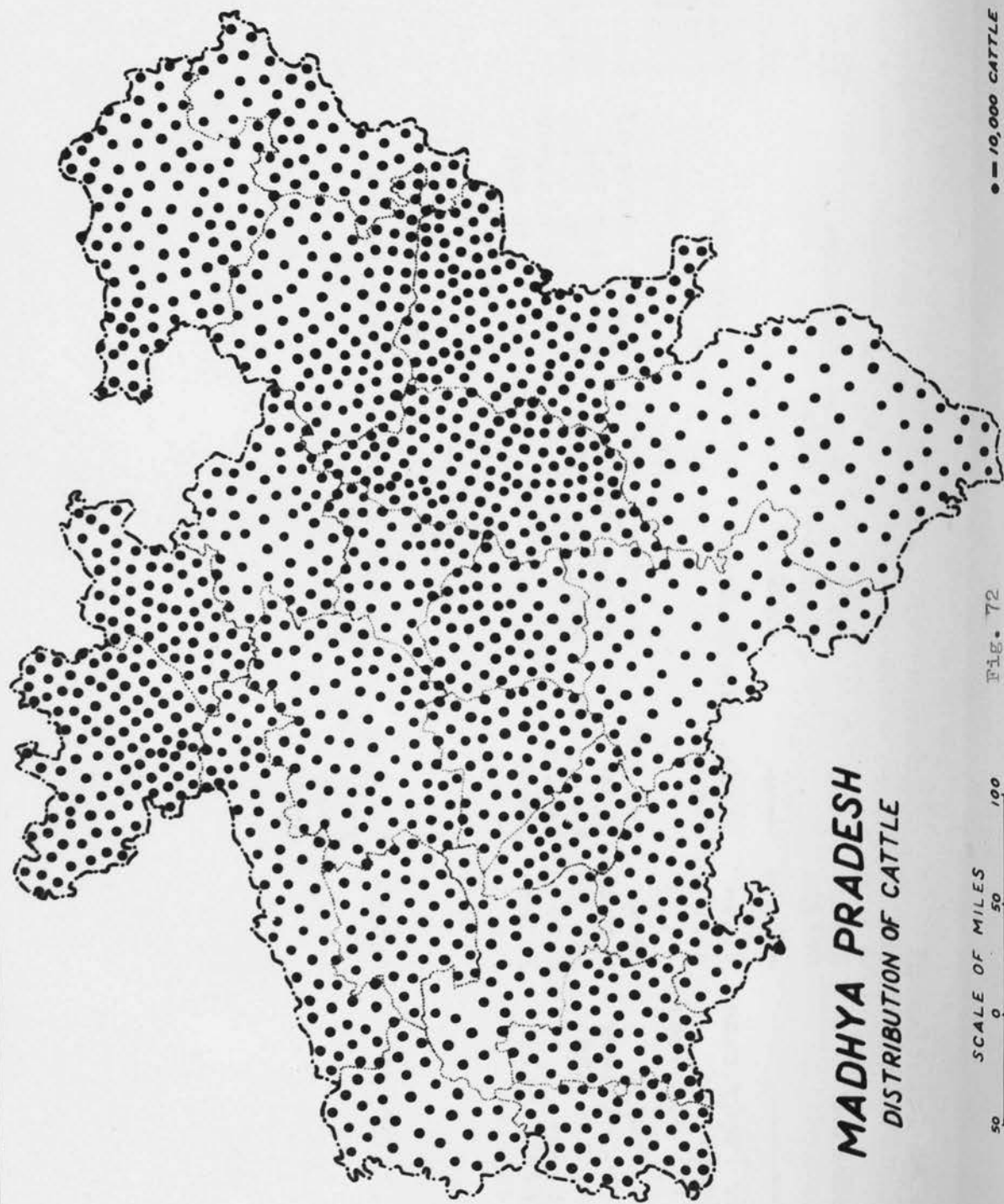
Table No. 48 Showing the crop zones, subzones, soil origin, type of soil, soil condition, rainfall, location and divergence in cropping pattern.

Zone	Subzone	Soil Origin	Soil	Soil Condition	Rainfall	Location	Divergence in Cropping Dependent on
Cotton	1. Cotton, Jowar, Wheat Rabi oilseeds	Trap	Heavy clay loam	Fully mature	20" to 45"	Purna valley, Wardha valley, east to Nagpur, Tapi valley	General rainfall and position
	2. Cotton, Jowar, Kharif pulses passing to Bajra	Trap	Medium loams, Regar 2nd class	Varying stages of maturity	20" to 45"	On higher areas associated with above	Rainfall and <del>of</del> maturity
Wheat	3. Wheat and other rabi crops with cotton and jowar subordinate	Trap	Heavy clay to medium loams	Varying stages of maturity	36" to 50"	The plateau and western areas north of Narmada passing imperceptibly into No. 4	Position and maturity
	4. Wheat	Old alluvial and trap	Heavy clay loams	Mature	44" to 60"	The Narmada and adjoining area	Practically nil other than that included by intrust <sup>on</sup> subzones 2 and 5

(continued below)

Table No. 48 (continued)

Zone	Subzone	Soil Origin	Soil	Soil Condition	Rain-fall	Location	Divergence in Cropping Dependent on
Paddy	5. Paddy, wheat and rabi oilseeds	Meta-morphic	Brown, heavy loams	Mature	50" to 55"	Wainganga valley	Position and irrigation facilities
	6. Paddy, Cane, lesser millets and pulses, Kharif oilseeds	Meta-morphic and in part laterite	Red and brown, sandy and medium loams	Varying stages of maturity	50" to 55"	Higher parts of Wainganga valley, high lying eastern plateau and north east of State of high lying tract of Chhattisgarh	Position and soil maturity and irrigation
	7. Paddy, wheat and rabi	Late-rite	Ranging from clay loam to light loam	Mature and immature	55" and above	Chhattisgarh	Position as affecting maturity and irrigation facilities



**MADHYA PRADESH**  
**DISTRIBUTION OF CATTLE**

SCALE OF MILES  
50 0 50 100

Fig. 72

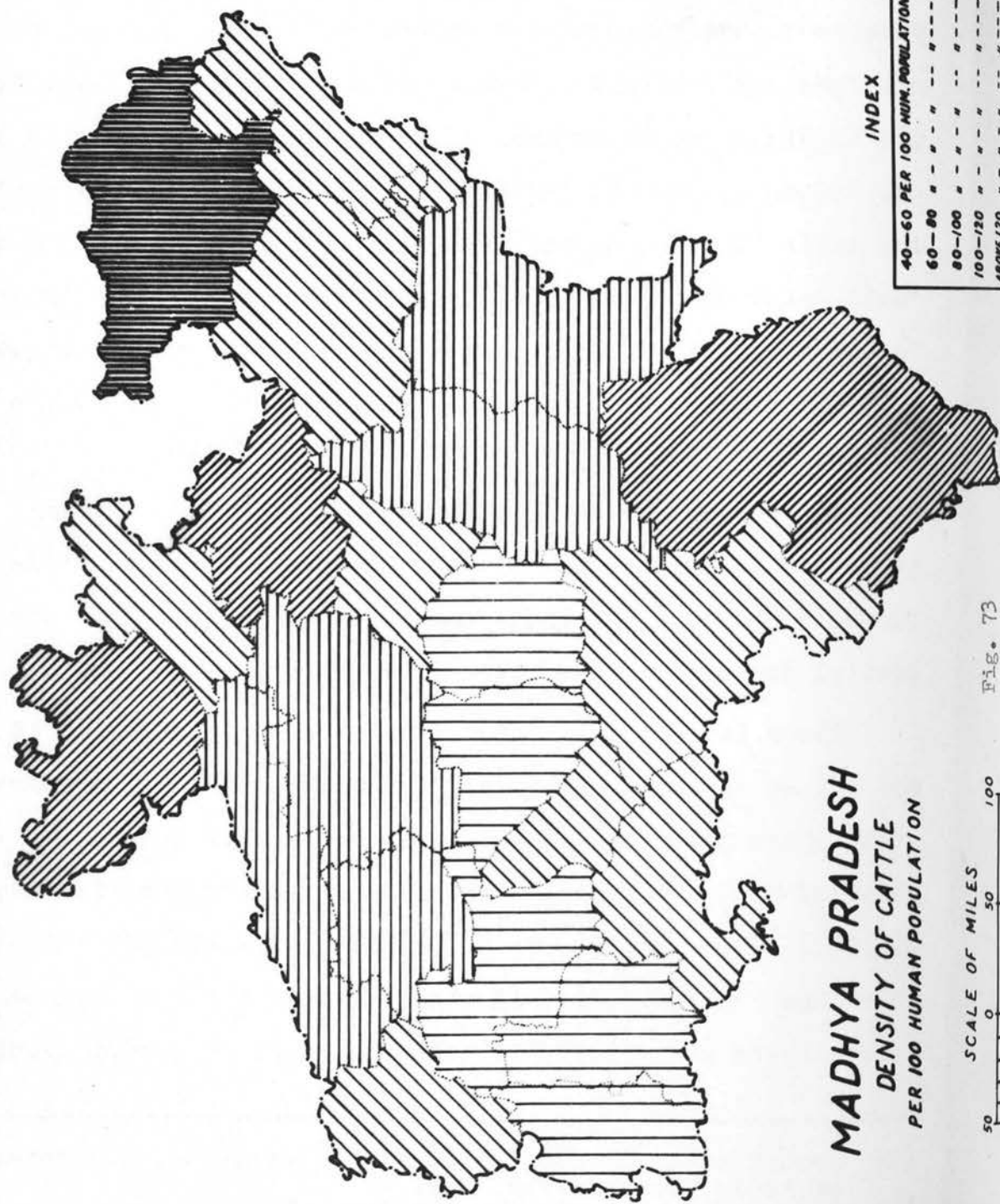
● = 10,000 CATTLE

Livestock, (Fig. 72-74). At the very outset it must be mentioned that "livestock enumeration in India has not yet attained any desirable standard of accuracy". (1) Realising the handicap the Government of India Planning Commission drew the "attention to the inadequacy of such data and the need for their improvement was drawn in the First Five Year Plan". (2) "Data relating to livestock", further the Commission observes, "numbers and livestock products and fisheries are inadequate and defective". (3) Hence, a caution when studying this problem.

The object of cattle breeding in India and western countries is different. In the western countries cattle are for milk and beef, in India for milk and work. They are essential features in the agricultural economy of India.

There is an unduly large number of bovine animals in all the States of India, including Madhya Pradesh. The consequences are poor feeding and inferior type of animals. Instead of being an asset, overwhelming numbers are liabilities. In 1952, there were 14,570,804 cattle and 2,413,349 buffaloes in Madhya Pradesh. (4) In the same year the net cropped area of the State was 29,433,870 acres. In other words, about 58

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- (1) Report on the Marketing of Cattle in India, Government of India, Bombay 1956, p.5.
  - (2) Second Five Year Plan, op.cit., p.280.
  - (3) Ibid, p.280
  - (4) Tables of Agricultural Statistics,pp.cit., p.18.



**MADHYA PRADESH**  
**DENSITY OF CATTLE**  
**PER 100 HUMAN POPULATION**

SCALE OF MILES  
 50 0 50 100

INDEX

40-60 PER 100 HUM. POPULATION	60-80	80-100	100-120	ABOVE 120
Horizontal lines	Diagonal lines (top-left to bottom-right)	Diagonal lines (bottom-left to top-right)	Cross-hatching	Dense cross-hatching



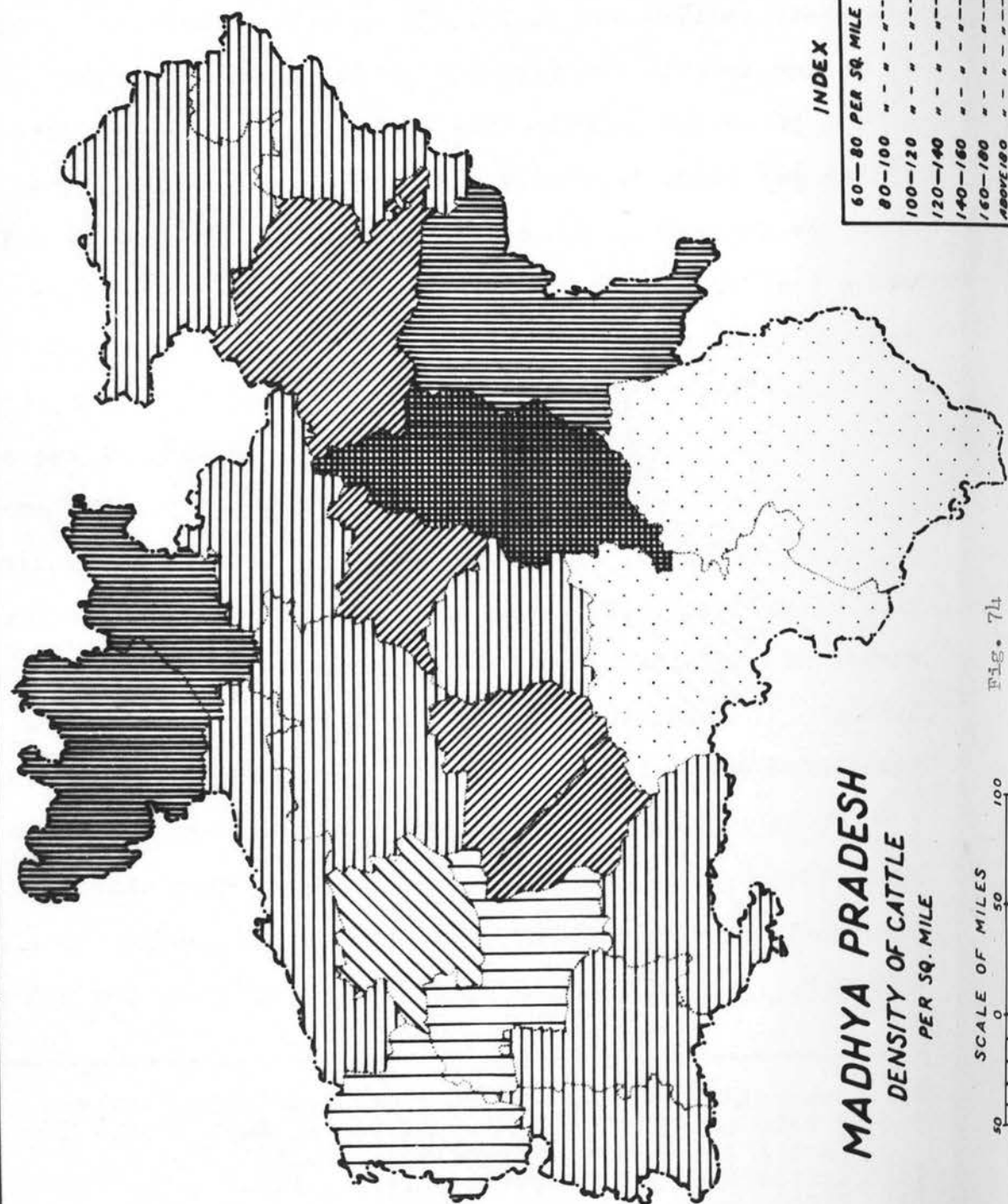
animals per 100 net cultivated acres. The population of the State in 1951 was 21,247,533 and thus there were about 80 bovine animals for each 100 persons. Despite this huge number of bovine animals "the estimated consumption per capita per diem, is hardly 2 oz., as against the figure of 1 lb. prescribed by the modern health standards." (1) This means that to meet the requirement the supply should be increased eight times over the present supply.

According to the Cattle Marketing Report of 1956, this State has about 14.86 million of cattle, or 9.5% of the total cattle of India (Fig. 72). This comes to 46 per 100 acres of cultivated area, 70 per 100 persons, and 114 per square mile (Fig.73-74). (2) According to the same source, the number of buffaloes is about 2.6 million, or 6% of the Indian total. It means there are 8 buffaloes per 100 acres of cultivated area, 12 per 100 persons and 20 per square mile. (3)

It is interesting to note "that during the six years period ended 1951, a very significant increase of more than 13% (13.3% accurately) has been recorded in the cattle population of the country". (4) It is also worth noting "that in the six years

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- (1) Mangrulkar, M. Y., Director of Veterinary Services, M.P. - A note on Dairy Units in Big Towns, M.P. Census Report, Part I A, op.cit., Appendix K., p.351
  - (2) Cattle Marketing Report, op.cit., p.8.
  - (3) Ibid., p.11.
  - (4) Ibid., p.17.





INDEX

60-80 PER SQ. MILE	80-100	100-120	120-140	140-160	160-180	ABOVE 180
[Vertical lines]	[Diagonal lines \]	[Diagonal lines /]	[Cross-hatch]	[Dense cross-hatch]	[Dense cross-hatch]	[Dense cross-hatch]

**MADHYA PRADESH**  
DENSITY OF CATTLE  
PER SQ. MILE



Fig. 74

ended 1951, though the population of both cows and she-buffaloes increased by 11.6 per cent, the total milk production of the country has shown a decline of 2.7 per cent". (1) It shows that there is a gradual deterioration in breeds. Mukerjee is of the opinion that "the population of grazing animals comprises about 500 per square mile, considerable numbers of which are inefficient and worn out cattle but are maintained in compliance with Hindu religious sentiment". (2) In the same connection he says that "the improvement and cultivation of fodder crops will be futile, if not actually harmful, if the peasants continue their present attitude towards the maintenance of uneconomical and useless cattle, which represent the staggering figure of 125 million heads... But the social sentiments die hard in India and for several decades the excessive burden of worthless, superfluous beasts will aggravate the poverty of small-holders and the exhaustion of soil and grass-land resources". (3) Sagreiya submitted a note to the Industry Survey Committee of the Central Provinces and Berar in which he said that "in fact low grazing rates are positively harmful as they encourage the keeping of useless animals who in turn compete for the available fodder with the

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(1) Cattle Marketing Report, op.cit., p.28.

(2) Mukerjee, Radha, Kamal, Food Planning for Four Hundred Millions, London 1938, p.8.

(3) Ibid., p.8.

essential cattle and thus bring about their degeneration also. The supply to slaughter-houses is Nature's remedy to adjust matters. It is prompted by that instinctive urge in man which teaches him to ameliorate his condition by getting rid of what is a drag on him rather than a source of comfort, even in the fall of false sentimental scruples - 'false' because slaughter is a kindness, indeed a deliverance, from the state of perpetual semi-starvation to the dumb creature..."(1)

The poor breed of cattle is another serious problem. Cattle Marketing Report says that "only about 16 to 20 per cent are fair representatives of well-defined breeds and even out of these, a large number may not be exactly typical of the breed. Therefore, the problem of cattle and buffalo breeding in India is mostly concerned with the grading up of non-descript." (2) To improve the situation, the important recommendations of the Committee are "(1) organisation of Co-operative Dairy Bull and Herd Improvement Associations and Co-operative Cattle Marketing Societies, (2) carrying out a great deal of educative propaganda in order to make out a case for popularising pedigree animals and (3) establishment of regulated markets for cattle and buffaloes." (3)

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- (1) Report of the Industry Survey Committee, C.P. & Berar, Vol. I, Part II 1936, Nagpur, 1936, p. 87  
 (2) Cattle Marketing Report, op.cit., p. IX.  
 (3) Ibid., p. IX.

In connection with increasing milk production, Baljit Singh says that "according to Dr. Burns, it is possible to increase milk yield to the extent of 75 per cent in the case of cows, 60 per cent for buffaloes and 50 per cent for goats. A large part...can be realized simply by improved feeding and better management, and therefore, without much loss of time... Feeding can be improved by eliminating the unfit cows, bullocks and buffaloes." (1)

The Government of India Planning Commission is alive to the importance of cattle in the rural economy of the country. Pointing out its own limitations the Commission says that "there is a tendency for the number of surplus cattle to increase even in the ordinary course and this trend will become more marked owing to action taken in recent years to place a total ban on the slaughter of cattle. Proposals for bans on the slaughter of cattle derive from a widely prevalent sentiment which has found expression in the Constitution and must inevitably also enter into national planning." (2) It would be relevant to quote Article 48 of the Constitution of India which lays down that "The State shall endeavour to organise agriculture and animal husbandry on the modern and scientific lines and shall, in particular, take steps for

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- (1) Singh, Baljit - Population and Food Planning in India, Bombay 1947, pp. 135 and 136.  
 (2) Second Five Year Plan, op.cit., p.282.

preserving and improving the breeds, and prohibiting the slaughter of cows and calf and other milch and draught/<sup>cattle</sup>." (1)

It will be seen that by putting the proviso of prohibition, it defeats its own objective. Unless the uneconomic animals are eliminated, it will not be possible to improve the breeds. In 1954, an expert committee on the prevention of slaughter of cattle was appointed by the Government of India. "A complete ban on the slaughter of all cattle" opines the Committee "would tend to increase their number further and to jeopardise the well-being of the limited number of good cattle which the country possesses. It might also result in rapid increase in the number of wild cattle...(and) if slaughter of cattle were totally banned, the cattle population would increase at the rate of nearly six per cent per annum." (2)

In view of the above directive principle, it was decided to establish 160 'gosadan' (houses to maintain unserviceable and unproductive cattle) for 320,000 heads of cattle under the first plan. The Planning Commission admit that "the scheme did not make satisfactory progress. Altogether about 22 'gosadans' for 8,000 cattle have been established and many of these have found it difficult to secure the areas of land needed for their operations." (3) This measure obviously

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- (1) Constitution of India, <sup>Delhi, 1956,</sup> Article 48, p. 27  
 (2) Second Five Year Plan, op.cit., p.283.  
 (3) Ibid., p.283.

proved a complete failure. Still in the light of the past bitter experience, under the second plan only 60 'gosadans' for about 30,000 cattle have been proposed. (1) Realising the low number of 'gosadans' proposed, the Commission is of the opinion "that even if it were a question only of establishing 'gosadans' for the care of unserviceable and unproductive cattle, it would be impossible to establish enough of them." (2) Further, under the second plan "it is proposed to select 350 'goshalas' <sup>with</sup> out of a total number of 3,000 as centres to be developed for livestock improvement. These 'goshalas' will send their unserviceable and unproductive cattle to the nearest 'gosadans'." (3). The Government will provide to each 'goshala' a number of improved bred and the 'goshalas' themselves will secure an equal number from their own resources.

The measures adopted by the Planning Commission under both plans have been half-hearted and not effective. Unless and until the useless and uneconomic animals are eliminated the problem will not be solved.

Five Year Plans and Agriculture. In the First Five Year Plan (1951-52 to 1955-56). the emphasis was on agriculture, irrigation and transport, while in the Second Plan (1956-57 to

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- (1) Second Five Year Plan, op.cit., p.283
  - (2) Ibid., p.283
  - (3) Ibid., p.283



1960-61) the emphasis has been shifted to the industry, mining and transport as is evident from the table given below. (1)

Table No. 49 Showing the percentage distribution of plan outlay by major heads of development.

Major Heads	First <u>Plan</u>	Second <u>Plan</u>
1. Agriculture and community development	15.1	11.8
2. Irrigation and Power	28.1	19.0
3. Industry and Mining	7.6	18.5
4. Transport and Communication	23.6	28.9
5. Social services	22.6	19.7
6. Miscellaneous	3.0	2.1
Total	100.0	100.0

Giving the reason for top priority to agriculture the Government of India Planning Commission says that "this was natural priority in a plan seeking to raise the standard of living of the mass of the people, specially in rural areas, but it was also justified in the special circumstances of shortage and inflation which existed when the plan was formulated." (2) The objective of "the second five year plan is in one sense a continuation of the developmental effort commenced in the first plan; but there is inevitably a shift in priorities with a larger

(1) Second Five Year Plan, op.cit., pp. 51 and 52.

(2) Ibid., p.255.

accent on industrialisation, especially the development of heavy industry, and the necessary ancillaries like transport." (1) Not only has agriculture lost its top priority in the second plan but also there is a change in emphasis in the agricultural programme. "In agriculture" said the Union Food Minister, addressing the Third Conference of State Agriculture Ministers, "emphasis was proposed to be shifted from production of cereal crops to diversification of agricultural production, to putting land to the best possible use..." (2) "In the second five year plan," according to the Planning Commission, "agricultural programmes are intended to provide adequate food to support the increased population and the raw materials needed for a growing industrial economy, and also to make available larger exportable surpluses of agricultural commodities." (3) In July 1955 (six months before the expiry of the First Plan period), the Government issued the framework of the second plan on the basis of which the second plan was to be developed. According to this framework, the most important object of the plan is the "Rapid industrialisation, with particular emphasis on

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(1) Second Five Year Plan, op. cit., pp. 51.

(2) Indian News, India House, London, March 3, 1956.

(3) Second Five Year Plan, op.cit., p.259.

the development of basic industries..." (1) The objective mentioned regarding agriculture is "to increase productivity in agriculture and to speed up agrarian reforms with an equitable distribution of land to peasant cultivators so as to stimulate the increase of agricultural production and of purchasing power in rural areas." (2)

The target set for agricultural production at the end of the first plan was not only achieved but exceeded one year ahead as "the increase in food production made possible a reduction in imports from the level of 4.73 million tons during each of the past two years." (3) But during the current season (1956-57), a different story is told. As mentioned earlier, this year the Government of India is to import 3.5 million tons of food grains. The reason is very simple and plain. Agriculture in India is still mostly a gamble in rain, and cultivators must depend on the mercy of weather. For the last 2 years the weather has been adverse in most parts of India.

The total food grains production in India in 1951-52 (the first year of the first plan) was 51.2 million tons and the estimated production in 1955-56 (at the end of the first plan) was 65 million tons. (4) "The total food requirements

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- (1) Second Five Year Plan, The Framework, Ministry of Information and Broadcasting, Government of India, Delhi, 1955, p.53.  
 (2) Ibid., p.13.  
 (3) Second Plan, op.cit., p.257.  
 (4) Ibid., p.256.

in 1960-61," according to the Planning Commission, "at the present rate of consumption, will be 70.5 million tons. By the end of the second plan (1960-61) the rate of consumption is estimated to rise to 18.3 ounces per adult (cereals 15.5 ounces and grain and pulses 2.0 ounces), so that the total food requirements will be 75 million tons. The plan provides for increase in food production of 10 million tons over the next five years." (1)

Under the first plan the aim was to increase food grains. But in the second plan "the aim will be to diversify agricultural production, and to shift somewhat the emphasis which has been hitherto placed in a dominant degree on the production of cereal crops." (2) This can also be verified from the table given below. (3)

Table No. 50 Showing comparative percentage increase of agricultural commodities at the end of the First and Second Five Year Plans.

<u>Commodity</u>	<u>First Plan</u>	<u>Second Plan</u>
1. Food grains	14	15
2. Oilseeds	8	27
3. Sugar ('gur' i.e. unrefined sugar)	13	22
4. Cotton	45	31
5. Jute	64	25

Second Plan, op.cit., p.260.

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- (1) <sup>Five</sup> Second/Year Plan, op.cit., pp.259 & 260  
 (2) Ibid., p.260  
 (3) Ibid., pp.255 and 262.

In the first plan "crops like arecanut, coconut, lac, black pepper, cashewnut, etc....did not receive sufficient attention..." (1) But in the second plan there is a programme to increase their production as is evident from the table given below. (2)

Table No. 51 Showing percentage increase over the estimated production in 1955-56 of certain commodities.

<u>Commodity</u>	<u>Percentage increase</u>
1. Coconut (oil)	62
2. Arecanut	23
3. Lac	33
4. Black pepper	23
5. Cashewnut	33
6. Tea	9

To sum up the table given below gives the estimated production in 1955-56 (end of first plan), targets of agricultural production at the end of the second plan, estimated production in 1960-61 (end of the second plan) and percentage increase. (3)

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- (1) Second Plan, op.cit., p.260.  
 (2) Ibid., p.262.  
 (3) Ibid., p.262.

Table No. 52 Showing the principal targets of agricultural production in India

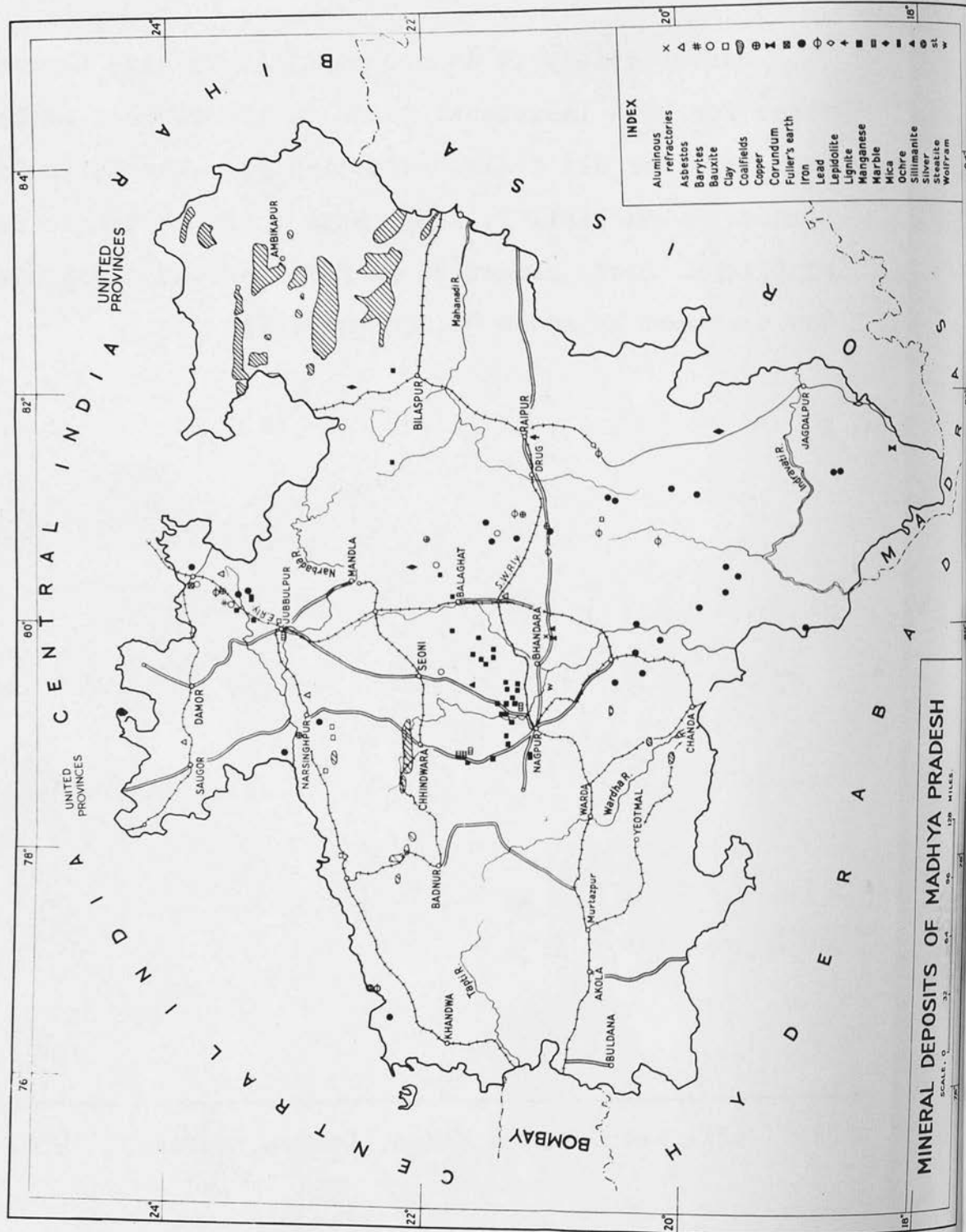
Commodity	Unit	Estimated Production in 1955-56	Target of Additional Production	Estimated Production in 1960-61	Percentage Increase
1. Foodgrains	Million tons	65.0	10.0	75.0	15
2. Oilseeds	Million tons	5.5	1.5	7.0	27
3. Sugar cane (unrefined)	Million tons	5.8	1.3	7.1	22
4. Cotton	Million bales	4.2	1.3	5.5	31
5. Jute	Million bales	4.0	1.0	5.0	25
6. Coconut (oil)	Thousand tons	130.0	80.0	210.0	62
7. Arecanut	Million maunds (maund = 82½/7 lbs)	2.2	0.5	2.7	23
8. Lac	Million maunds	1.2	0.4	1.6	33
9. Tobacco	Thousand tons	250.0	--	250.0	--
10. Black pepper	Thousand tons	26.0	6.0	32.0	23
11. Cashewnut	Thousand tons	60.0	20.0	80.0	33
12. Tea	Million pounds	644.0	56.0	700.0	9



Unfortunately it is not possible to give targets fixed for each individual State as the figures at the disposal are for all India collectively. The India News, London, dated April 7, 1956, says that the target for additional food production in M.P. for the first plan was exceeded by about 90,000 tons. (1)

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(1) India News, India House, London, April 7, 1956.



## Chapter VII - Mines and Minerals.

(Figs.75 and 75A)

The General Situation : Survey and Development with the exception of Bihar, M.P., with its extensive deposits of manganese, iron ore, coal, etc., may be the most richly endowed state in the country. The information, though suggestive of a wealth of minerals, is incomplete and lacks detail. Sir Cyril Fox, formerly Director of the Geological Survey of India, has said that "the work of geologists in India was mainly to promote the export of raw materials rather than to encourage industrial development in this country." (1) The immediate problem is the geological mapping of the whole State on one inch to one mile scale, at least, with large scale plans of mineral bodies and detailed accounts of the quality and quantity of the mineral products. In recent years some progress has been made in the survey of mineral reserves but still "present estimates of reserves are rough guesses." (2) The mineral development so far

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- (1) Report of the Provincial Industries Committee, C.P. and Berar, 1945, op. cit., p.22.
  - (2) Draft outline of the First 5 year Plan, Delhi 1951 p.139.

has remained a Provincial subject, a fact which has resulted in no coordination in the mineral policy and exploitation for the whole of India. The Second Report on Reconstruction Planning has recommended central control over all minerals of strategic or key industrial importance. (1) Not only is the development of minerals to be controlled by the centre but also the industries connected therewith.

Apart from several well-organised and flourishing mining centres there exist several deposits which, though known for decades, have either not been examined in detail or are not economically workable under present circumstances, but may yield to processes of beneficiation if proper research is carried out. Many of these are likely to prove workable in future.

The brief resumé of the geology of the State given earlier hardly gives any idea of the even distribution of the minerals in different geological formations, and some of them, like limestone, iron ore, etc., repeatedly occur in rocks of different ages.

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(1) Second Report on Reconstruction Planning, Delhi 1944, p.34.

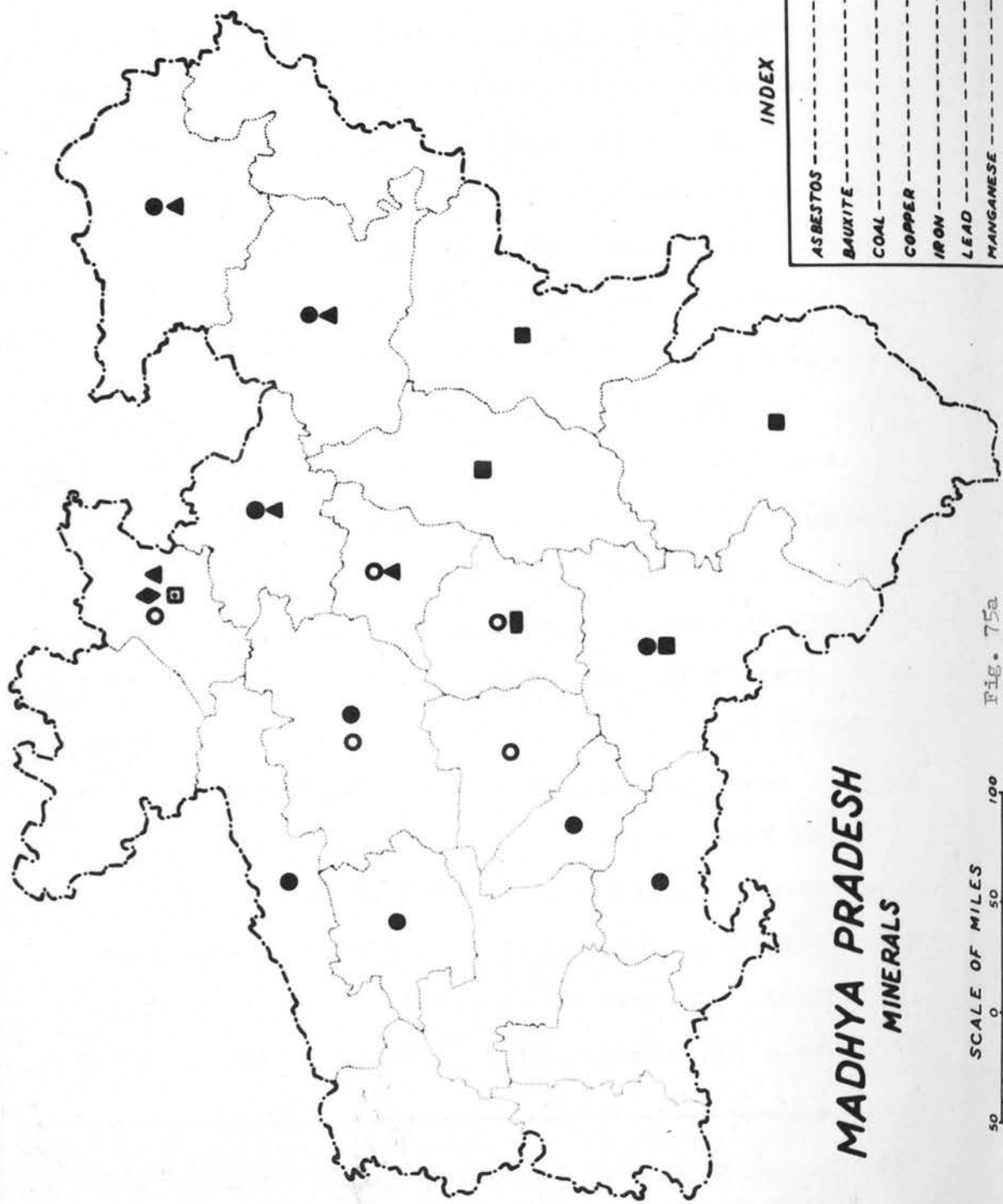


Fig. 75a

I. Mineral Fuels. Of the two minerals, coal is well distributed in this State. Coal, generally, is not of high quality. Coking coal, limited quantity, is found only in the Mahanadi Valley. The coalfields of M.P. fall into 4 natural groups - (1) Valleys of the Son tributaries, (2) Brahmani - Mahanadi, (3) the Satpura, and (4) the Wardha Valley. Lignite is known to exist in the State but neither its extent nor reserves is known.

1. Coal. Coal and iron are the most important basic minerals on which modern civilisation is based and they are a yardstick for measuring industrial development. The greater their production the more advanced is the country. Madhya Pradesh stands next only to Bihar and Bengal in coal production and the production is rapidly increasing. From 1900 to 1950, the contribution of M.P. was 6% of the total Indian production. Since 1950 the percentage increased to 9.41%. (1) In 1950, Madhya Pradesh produced a little less than 2.97 million tons of coal, (2) while in 1954

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(1) Brown & Dey - op. cit., p.28.

(2) Census Report, vol. VII Part I-A, op.cit., p.196.



it was a little more than 4.6 million tons. (1)  
 Production was roughly doubled during 1950 and 1954,  
 and will go up more rapidly in years to come, as  
 envisaged in the second Five year Plan, when steel  
 manufacturing is in full swing. In 1950 about  
 30,033 persons (2) were employed by the coal mining  
 industry and the figure must be considerably higher  
 now. Unfortunately the per capita production is not  
 very high and stood at 101.94 tons in 1951. It,  
 nevertheless, compared favourably with that of  
 Bengal (100.63 tons) and Bihar (97.01 tons) although  
 they enjoyed better working facilities and have  
 better deposits to work.

The coalfields of Madhya Pradesh fall into the  
 following four main natural groups:- (3)

- (a) the Chhattisgarh;
- (b) the Satpura;
- (c) the Wardha Valley; and
- (d) The Mahanadi Valley

Although formerly considered to have been formed  
 in block faulted basins, recent opinion tends to

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- (1) Second Five year Plan, 1956, op. cit., p.380.
  - (2) Census of India, 1951, Vol. VII Part I-B, Subsidiary  
 table 5.9, p.145.
  - (3) Brown & Dey : op. cit., p.29.

indicate that the entire east coast of India was one extensive river basin in which coal was formed practically over the whole area. Subsequent faulting cut it into the present river basins, while the uplifted parts were subjected to weathering, and the coal beds were denuded. Sir Cyril S. Fox, recently Director of the Geological Survey of India, has given a detailed description of all the coal mines, but this appears to be in need of revision, as his description dates back to 1934 and since then much work and researches have been made. (1) In recent years some major discoveries have been made and the reserves have been enhanced very considerably. Sir Cyril Fox made a rough estimate of the reserves of coal in M.P. up to a depth of a thousand feet as under. (2)

1. Chhattisgarh - Mahanadi	-	1,000	million tons
2. Satpura region	-	150	" "
3. Wardha Valley	-	4,000	" "
		<hr/>	
Total		5,150	" "

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- (1) Cyril S. Fox - Memo, G.S.I., Vol. LIX, 1934, Calcutta 1934, chp. 12, 13, 14, 15, 16, pp. 196-315.  
 (2) Krishnan : Rec. G.S.I. Vol. 73, pt.3, (1939) Calcutta 1939, p.400.

If total coal available in the State is taken then according to Dr. Fox, it is 17,000 million tons.

Chhattisgarh - Mahanadi	-	4,000	million tons
Satpura region	-	1,000	" "
Wardha Valley	-	12,000	" "

No workable coal occurs in the post - Barakar Gondwana beds anywhere in Madhya Pradesh, and the quality is generally inferior to that of Bihar, being usually higher in ash contents. The total reserves are not known but may be of the order of over 25,000 million tons.

Coal distribution is far more extensive than is known at present, as wide areas covered by younger Gondwana beds or by Deccan Traps may conceal workable seams. There are large areas where coal-bearing rocks are believed to be concealed, as in Wamanpali, Lathi and Dabha. (1) One such discovery was made about a decade ago near Nagpur, and wide areas well connected by communication lines have been proved to possess workable seams there.

(a) The Chhattisgarh basin comprises the important coalfields of Tatapani, Ramkola, Burhanpur, Jhilmili, Kurasia, Sonhat, Jhagrakhan and a few others.

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(1) Brown & Dey : op. cit., p.43.

They cover an area of 880 sq. miles and the total reserves are estimated to be more than 957 million tons.(1) The coal available is generally of good quality, and that from Jhilimili is of semi metallurgical character. Only a part of this vast area is served by lines of communications.

(b) The Satpura Basin comprises Mohpani, Sonada, Shahpur, Dulhara, Patakhara, Kanhan Valley and Pench Valley. This basin does not appear to be so promising and the Mohpani and Gotitora mines, closed down in 1927, have not been revived. At the present time the only area exploited is the Pench Valley (2).

(c) The Wardha Valley coalfields cover an aggregate area of 30 sq. miles and the reserve of the coal may be of the order of 1,200 million tons. Unexplored areas flank this coalfield and may carry large reserves. The region comprises the coalfields of Bandar, Warora, Wun, Ghuglus-Telwasa, Chanda, Ballarpur, Wamanpalli, Sasti-Rajura, Antargaon, Tandur, Sandrapalli, Kamarum, Bandala-Allapali, Lingala, Singareni, Kottaguden, Damarcherla, Ashwaraopeta and Bedadanuru.

In the opinion of Dr.Krushnan, recently Director of Geological

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(1) Krushnan M.S. Geology of India & Burma, op.cit.,p.292.

(2) Ibid, p.292.

(3) Second Five Year Plan, op.cit., p.380.

Survey of India, "there is every probability that several of these coalfields are much more extensive than they appear and extend underneath the younger rocks". (1).

(d) The Mahanadi Valley Coalfields include Hasdo-Rampur (Surguja), Korba, Mandriver, Raigarh (N. and S.), Hinger, Ib River (Rampur) and Talchin. Some of these coalfields are potentially important.

The Kamptee Coalfield is high in ash contents, but is to be used for the Khaperkheda power house. The Gorwari and Rakhikol fields, however, have semi-metallurgical qualities of coal and the possibilities of getting better quality coal in the yet un-explored areas to the West cannot be ignored. Recent investigations indicate a distinct improvement in quality proceeding westward.

The seam in the Korba Coalfield is 154 ft. thick and may be the thickest single seam in the world. Its quality is good and some parts are coking. Its coal is to be used for the Rourkela Steel Plant to be set up in the near future. The Korba Coalfield is to be developed under the second Five Year Plan (1956-61). The output in 1954 was nil but the production of this field in 1960-61 is expected to be 4 million tons. (2)

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(1) Geology of India and Burma, op.cit., p.292.

(2) Second Five Year Plan, op.cit., p.380.

The following table shows the anticipated distribution of coal output in the Madhya Pradesh at the end of the second Five Year Plan as compared with the distribution in 1954:- (1)

Table No. 53 Showing the anticipated distribution of coal output in M.P.

<u>District or Locality</u>	<u>Output in 1954</u>	<u>Output in 1960-61</u>	<u>Increase</u>
	<u>in million tons</u>		
1. Chhindwara and Chanda	2.25	2.25	-
2. Korba	.. (a)	4.00	4.00
3. Sasti	0.07	0.07	-
4. Central Indian Coal- fields	<u>2.31</u>	<u>5.31</u>	<u>3.00</u>
TOTAL:	4.63	11.63	7.00

Out of the target of 60 million tons of coal per annum, Madhya Pradesh would produce about 12 million tons, i.e., 20% of the total production of India. In other words, Madhya Pradesh's contribution will increase from 9.41% in 1950 to 20% in 1960-61.

From the table given below it will be observed that most of the 30 million tons of coal produced in India is utilized at present for steam raising and as domestic fuel. For blast furnace, a very small quantity is coked.

(1) Second Five Year Plan, op.cit., p.380

(a) No production in 1954



Table : 54 Showing the consumption of coal in India (1)

<u>Use:</u>	<u>Quantity in million tons:</u>	<u>% of total:</u>
Railways (mainly steam raising)	10.0	34
Mills and works (mainly steam raising)	4.5	15
Iron and steel works	4.5	15
Electricity generation	1.0	3
Collieries	2.0	7
Cement works	0.5	2
Brick-burning	1.0	3
Chemicals, glass and potteries	1.0	3
Bunker and export coal	2.0	6
Domestic, etc.	3.5	12
<b>TOTAL:</b>	<b>30.0</b>	<b>100</b>

Out of a total production of 38 million tons in 1955, the public sector contribution was only 4.5 million tons, the rest came from private sector.(2) It has been deemed for the planned economic development of the country that all basic minerals exploitation should be taken into public sector immediately after giving reasonable compensation to the owners of private sector. Realising its importance "the Industrial Policy Resolution of 1948 laid down that all new undertakings in coal are to be in the public sector except where, in the national interest, the Govt. wish to secure the cooperation of private enterprise." (3) The target

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(1) The wealth of India Vol.II-C., Delhi, 1950, p.254

(2) Second Five Year Plan, *op.cit.*, p.378

(3) *Ibid.*, p.378.

for the second plan is 60 million tons, i.e., an increase of 22 million tons over the production of 1955. Out of this extra 22 million tons, 12 million tons are to be from the public sector. (1) Out of the quota of the public sector the Korba coalfields shall be developed to produce 4 million tons. (2)

There are certain problems which need immediate attention if India wants to put her coal production on a scientific line. The present methods of raising and utilising coal need considerable improvement. The first need is for electrification. The somewhat more widespread use of specialised machinery is another. Fuel resources should be conserved by the use of inferior varieties of coal for power generation, particularly in view of the large demands that are likely to be made as a result of the progressive industrialisation of the country. Conservation of coking coal is of vital importance for India's industrial future.

India is short of natural petroleum and should try to produce synthetic petrol either by hydrogenation of coal or by Fischer-Tropsch synthesis or by a combination of both.

2.Lignite: Lignite was discovered under the sand of the Karun River (3 miles southwest of Raipur in 1884). There

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(1) Second Five Year Plan, op.cit., p.378.

(2) Ibid, p.379

are other localities situated in the same area where such deposits also occur. P.N. Bose thinks that the quantity available may be considerable. (1) The Spate Work was done in 1884 but since then no further investigation has been made. Germany developed many chemical industries based on lignite as raw material. Hence, M.P. should also make a complete survey of its resources of lignite and try to develop the industries based on it.

## II Ferrous Minerals and its Alloys

There are various localities having large deposits of iron-ore. Not only are there large reserves of hematite, but it is of a high grade with above 60% of iron content. The deposits at Chanda, Durg, Kankar and Bastar deserve special mention for their quality and quantity.

In manganese deposit, M.P. is one of the foremost in the world, both in quality and quantity. Manganese is mainly confined to a belt, passing through Bhandara, Balaghat, Nagpur and Chhindwara districts.

Wolfram deposits are restricted in size and low in grade. It is confined in the district of Nagpur.

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(1) Krishnan, Rec.G.S.I, Vol. 74, Pt.3, 1939, Calcutta 1939, p.416.

1. Iron. Iron smelting is an ancient industry in India. In all the villages in Central India one can still see the village blacksmith's bellows being worked by a girl standing on top of the pair and alternately pressing and releasing the leather bags. Most of these blacksmiths do not have to go far for their raw material and they extract the metal from some local ferruginous shale in the Upper Gondwana beds, the Bijawar system rocks, or from laterite. The quality of the ore would be poor and would be uneconomical but for the fact that under the system of village organisation the blacksmith is largely maintained by the rest of the villagers, and in return he is expected to repair their farm implements. The annual yield per furnace could not possibly be more than about  $1\frac{1}{2}$  tons, but no actual estimates have been attempted. (1)

Various estimates of the reserves in M.P. have been made by different persons from time to time. In 1938, Krishnan recently the Director, Geological Survey of India, gave the estimated reserves of only 3 places, one having laterite ores and the other hematite ores containing 65% of iron. In the Kanhevara hills in the Jabalpur district, the laterite ores

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(1) Krishnan, Records G.S.I., Vol. 74, Pt.3., op.cit. p.408

deposits were estimated to be 49 million tons. (1) But this is a low grade ore. Hematite ores of high grade were estimated to be 114 and 610 million tons from 5 localities in the district of Durg and 14 in the district of Jabalpur respectively. (2)

During the decade 1942-1951, Geological Survey of India in Madhya Pradesh made investigation of certain minerals in certain localities of the State. The estimates of the reserves of high grade hematite ores given as follows: (3)

Bastar (3 localities)	829.3	million tons
Chanda	22.0	" "
Durg	31.4	" "
Total	882.7	" "

Another estimate has been given by Brown and Dey in India's Mineral Wealth and the reserves for M.P. are estimated to be 4,972 million tons, distributed as follows: (4)

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- (1) Krishnan, Records, G.S.I., Vol. 74, Pt. 3., op.cit., p. 409.
  - (2) Ibid, pp. 412 and 414
  - (3) Census of India, Vol. 7. M.P., Part IA, op.cit., p. 299.
  - (4) Dey and Brown, op. cit., pp. 183 - 185

Chanda (4 localities)	22	million	tons
Durg (5 localities)	104	"	"
Bailadila Range (Bastar)	3600	"	"
Rowghat Crest	740	"	"
S.W. of the Ridge	500	"	"
Kankar	6	"	"
	<hr/>		
Total	4,972	"	"

These are reserves of high grade hematite ores with above 60% of iron content.

The Director of the Geological Survey of India in his annual report for the year 1954, gives the deposits of hematite ores in the State which are "proved and indicated" to be 1,586 million tons and "possible" 7,000 million tons. (1)

There is another estimate given by Spate which is 1,100 million tons of ores containing 60-70% of metal. (2) According to the same source "at current output (c. 2.25 million tons a year) the life of India's iron ore can be reckoned in millennia rather than centuries. (3)

It will be noted that all the estimates are confined to high grade ores, containing above 60% of iron. No attempt has yet been made to survey the ores of low grade, which is expected to be much greater in quantity than the deposits

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- (1) Director, G.S.I. - Mineral Production of the Indian Union during the year 1954 - Indian Minerals Vol X, No. 1 January 1956, Delhi, p.31.  
 (2) Spate, O.H.K. - India and Pakistan, London, 1954, p. 264  
 (3) Ibid, p. 264



of high grade. In the world iron ore containing about 30% of iron is deemed to be fit for exploitation. (1) In Great Britain iron ore with as low as 23.1% of iron is "workable deposits" and are being utilised. (2) In U.S.A. the reserves of 30% iron is being smelted. (3)

In spite of the fact that Madhya Pradesh has huge deposits of iron ore, the output of this ore in 1953 was only 3,477 tons and was obtained from Balaghat, Bilaspur, Chanda, Durg, Jabalpur and Mandla. In 1954, there was a rise in production and was 7,055 tons. But in 1954 all production was from Chanda only and there was no output from other areas. (4)

The following are the four geological formation in which iron ore is found in the State:

- (1) Laterite,
- (2) The Chikiala and Barakan subdivisions of the Gondwana,
- (3) The Bijawar System, and
- (4) The Dharwar System.

It may, however, be stated without reserve that the first three are of little importance at present for any modern blast furnace industry in India where good quality ore is abundant and no one thinks of using ore with less than 60% of iron contents,

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- (1) Russell Smith, J. and Phillips, M. Ogden, Industrial & Commercial Geography, N.Y. 1946, p.140
  - (2) Smith, Wilfred - An Economic Geography of G.B., 2nd Edition, London 1953, p. 316
  - (3) Wright, Alfred J. - United States & Canada, London 1948,
  - (4) Mineral Production of the Indian Union, pp. 30 & 31. op. cit., p. 31.

as long as high quality is available. It is high time for India to consider and estimate her resources in low grade iron ores. These should be utilised for cheap types of iron and steel. The United Kingdom and the United States had exploited their high grade ores in the beginning with the result that they have to become dependent upon imported ores for the manufacture of good quality steel. If India wants to have a planned economy she must start using her low grade ores also side by side with high grade.

Lateritic ore, formerly the decomposition of the Deccan Traps in the hot tropical climate, is most abundant near Katni in the Jabalpur district, but is also found near Durg, Sagar, Yeotmal and elsewhere. In the Jabalpur district the lateritic ores <sup>are</sup> well seen at Bijori and in the Kanwhara hills. For the latter locality the reserves have been estimated at 49 million tons. The analysis of a sample indicated that it contained 57.52% of iron (1).

Deposits from the Gondwana System are known from the Pranhita Valley and from Chanda district. From a lower horizon they are known from Raigarh-Hingir coalfields.

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(1) Krishnan - Records, Vol 74, Pt. 3, 1939, op.cit., p.409

Iron ores in the Bijawar rocks are fairly common, but nowhere are the deposits rich in quality or quantity. In Madhya Pradesh they are particularly well known from Nimar, Hoshangabad and Narsinghpur. In the latter area the ore was in the past very extensively exploited for use in the indigenous furnaces, but the industry is on the decline.

Dharwar age iron ores have been surveyed to some extent in detail in recent years and the reserves within easy reach of the proposed Bhilai Steel Plant have, very conservatively, been placed at over 1700 million tons, averaging over 65% iron contents. Of particular importance from this point of view are the deposits known from the Dhalli-Rajhara, Rowghat (Antagarh) and Baidilla.

In the Dhalli-Rajhara (Durg district) hills, the formation is known from some 20 miles of almost continuous line. The ores are associated with phyllites and are often of the usual type of banded quartz-iron ore schist characteristic of the Dharwar system. In places, thick masses, apparently lenticular in shape, are formed of almost pure hematite. One of these from the Rajhara hill yielded an average of 66.56% iron. In addition, it was found to be poor in phosphorous and sulphur, and, therefore, of particular

- (1) Krishnan - Bulletin of the Geological Survey of India, Economic Geology No. 9, Iron-ore, Iron & Steel, Delhi, 1964, p. 132.  
 (2) Brown & Day - op. cit., p. 133.

importance. The total reserves of the Dhalli-Rajhara are known to be 114 million tons (1). But these are hematite deposits of high grade ore. The total reserves here may be of the order of several hundred million tons.

In the Dondi-Lohara area the estimated reserves exceed 100 million tons of over 67% iron content.

The iron deposit of Chanda district are of very great importance. Ten separate deposits are known for a couple of decades and though the work has not been exploited since, many more lie unexplored here. In Lohara alone the ore forms a hill 650 x 200 x 40 yards in dimensions and boring may reveal larger reserves underneath. The present estimate is 21 million tons of ore with above 68% of iron content (2). The deposit is now leased to the Tata Iron and Steel Company. Other Chanda district deposits occur at Asola, Dewalgaon, Pipalgaon, Poser and Ratnapur. In some of these an occasional magnetic band is known to occur and the last named is limonitic.

The iron ores of Jabalpur have been famous for long and have been extensively worked. At Ghogra a manganimiferous

(1) Krishnan - Bulletins of the Geological S. I. Series A - Economic Geology No.9, Iron-ore, Iron & Steel, Delhi, 1954, p.182.

(2) Brown & Dey - op. cit., p.185.

ore was smelted to produce the famous Kheri Steel for blades, and the industry flourished during the days when swords were supreme in the field of battle.

Recent investigations, however, indicate that the ore, though widely distributed, is generally not so rich as is found in other areas. It ranges in iron content from 45 to 60% (1). The total estimated reserves of Jabalpur is 100 million tons (2).

The deposits of the Bastar district, known from the Bailadila Range, are rich in high grade hematite ore with over 68% iron. The deposit is at least 610 million tons according to H. Crookshank (1938). But according to A.M. Heron and D.K. Chatterjee, who made later estimates, the reserves are to be 3,600 million tons (3). This ore resembles the banded-hematite-quartzite of Singhbhum (Bihar) and is amply suitable for exploitation for modern industry.

Besides the above mentioned deposits, there are other areas with smaller deposits, such as Rowghat with 740 million tons of hematite, with some limonite, Kanker (Bastar district) 6 million tons of massive hematite with over 64%

(1) Bulletin - op. cit., p.157.

(2) Ibid, p.182.

(3) Brown & Dey - op. cit., p.185.

of iron along with 20 million tons of detrital, micaceous & specular hematite (1).

2. Manganese. Madhya Pradesh possesses some of the best known manganese deposits in the world, and is also one of the largest producers in the world. Krishnan, formerly Director of Geological Survey says that "the total estimated reserves in the main belt of Nagpur, Bhandara and Balaghat would be of the order of 100 million tons, of which 55 million tons are likely to be of shipping grade ores, i.e., 42 per cent Mn. and over. There are some deposits in the Chhindwara district in Madhya Pradesh which have not yet been investigated and also others in Bihar, Orissa, Bombay, Madras, Mysore etc." (2).

The occurrence of manganese is confined to a belt, roughly 128 miles in length and 20 miles in width, extending through Bhandara, Balaghat, Nagpur and Chhindwara districts. Those of Jabalpur are, however, of a different origin - being lateritic - and are only sporadically of workable grade. Another type of ore occurs as bands and nodules in crystalline limestone. It is not usually workable.

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(1) Brown & Dey - op. cit., p.185.

(2) Krishnan, M.S. - The Mineral Production of the Indian Union During 1952, Rec. G.S.I., Vol86, Part 2, 1955, Calcutta 1955, p.356.



Although the presence of manganese ore in the State was known since 1829, the first prospecting licence was not issued till 1899, and the first shipment took place in 1900, when 47,257 tons were exported. Rapidly increasing, the production reached 351,880 tons in 1906, and 565,017 tons in 1907, and thereafter stabilized itself. In 1926, there was a record production of 761,365 tons, but depression set in soon after, and the decline brought it down to 28,789 tons in 1933, when many mines closed down. Since then the industry has gradually recovered, but during the last war there was no boom in this mineral as was experienced by all other mining industries. There has, nevertheless, been a wonderful boom during the last few years when the U.S. Government went in for their 'stockpiling' programme, and purchased all available ore, good, bad or indifferent.

The large reserve, and early initiative are reflected in the production of the ore. Madhya Pradesh produced 69% of all-India output up to the end of 1950 (1). The production of manganese ores is linked with the production of iron and steel. It fluctuates with the rise and fall of

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(1) Krishnan, M.S. - The Mineral Production of the Indian Union During 1952, Rec. G.S.I., Vol 186, Part 2, 1955, Calcutta 1955, p.216.

(2) Stamp, L. Dudley - Orinole's Handbook of Commercial Geography, London 1956, p.289.

iron and steel output. The production of manganese ore in Madhya Pradesh decreased from 914.9 thousand tons in 1953 to 714.7 thousand tons in 1954, as is shown in the table below: (1)

Table No.55 Showing Manganese Output in M.P. from 1951-1954.  
(Figures in tons)

District	1951	1952	1953	1954
Balaghat	357,420	398,202	516,558	396,077
Bhandara	177,370	167,521	201,054	181,782
Chhindwara	19,833	25,596	37,544	24,902
Jabalpur	3,250	9,018	8,845	805
Nagpur	142,896	149,119	150,482	111,140
Bilaspur	..	..	400	..
Total	700,769	749,456	914,883	714,706

Simultaneously with the decrease in the production of M.P., the All India output also decreased. It may be noted here that once India was the biggest producer of manganese ores in the world, but now it has been superseded by Russia which produced nearly half of the world production of 6.7 million tons in 1950 (2).

Being the most important producer of manganese ores in India, M.P. is the most important exporter of the commodity: out of a total production of 1,413,847 tons of ores in 1954, India exported 1,045,020 tons, leaving only 338,827 tons for

(1) Krishnan, M.S. - Rec. G.S.I., Vol 86, Pt.2, 1955, loc. cit., p.357 and Indian Minerals, Vol X No.1, January 1956, p.35.

(2) Stamp, L. Dudley - Chisholm's Handbook of Commercial Geography, London 1956, p.289.

internal consumption.

At present only a small quantity of manganese ore is consumed by the Indian iron and steel industry, and, therefore, most of it is exported. But with the rise in iron and steel production, as is envisaged in the second plan, the internal consumption will rise. The quantity of ferro-manganese produced in India is very small and there is a proposal for a plant to produce 90,000 tons per year. For the use in the glass and dry cell batteries industries a certain amount of manganese dioxide is produced in India. The annual consumption in these industries at present is 4,000 tons.

For its expanding iron and steel industry India must conserve her high grade ores. She must also try to make use of low-grade ore according to the process developed in the Nossen Laboratories, N.J. This process enables the use of raw material containing only 15% manganese and high iron, quite an economic proposition. Modern concentration methods should be introduced to recover ore from low grade material and save it from wasteful methods of the past. In the last, no manganese should be exported as the raw ore, but in the form of ferro-manganese.

Unfortunately, not much processing is carried out in the country and over 85% of the ore produced in India is shipped abroad in the crude state. The Government of India has now decided that it should be processed and converted into ferro-manganese before being exported. It is, therefore, proposed to put up two factories, one at Tumsar (District Bhandara) and the other at Ramtek (District Nagpur) and it may be expected that in a few years time all the exports will be in the form of processed and semi-finished goods. Further, systematic investigations now under way, aided by the Point Four Programme of the United States Government, are likely to enhance the known reserves very considerably. Under the Second Five Year Plan, the programmes of the work of the Geological Survey and the Bureau of Mines include "the continuation of the detailed mapping accompanied by drilling of the manganese ore belt in M.P." (1).

3. Wolfram. Wolfram was discovered at Agargaon in the Nagpur district in 1907. It occurs sparsely scattered in veins and stringers of quartz interbedded with mica schists and tourmaline schists of Dharwar age. The exploitation of this mineral is an uneconomic proposition as the deposits

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(1) Second Five Year Plan, op. cit., p.384.

are restricted in size and low in grade. The best out of the lot is the Degana mines in Rajasthan which produced about 300 tons of ore during the war under the war economy. But the production figures for all India given below reveals the uneconomic proposition of this mineral (1).

Table No.56 Showing the Output of Wolfram in India.  
(Figures in tons)

1951	1952	1953	1954
14.25	10	15	1

### III Non-Ferrous Minerals.

Except in aluminium and manganese, M.P. is poor in all non-ferrous metals. For that matter India too. Aluminium deposits occur in the districts of Mandla, Balaghat, Bilaspur, Surguja, Raigarh, Bastar, Durg and the Seoni subdivision (Chhindwara district). The known reserves with 50% or more  $Al_2O_3$  is about 9.7 million tons. Reserves with less than 50% of alumina is expected to be several times the above total.

1. Aluminium. Bauxite is the ore of the white metal aluminium. The ore has been known to occur abundantly at Katni and other localities. A special survey of the bauxite deposits of India was carried out recently by the Geological Survey of India and it is now known that Madhya Pradesh

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(1) Rec. G.S.I. Vol 86, Pt.2, 1955, p.376 and Indian Mineral, Vol X No.1, Jan., 1956, p.41.

possesses some of the richest bauxite deposits of the Country.

Deposits occur in the Amarkantak and Chauradadar plateaux of the Mandla district, in the Barhar plateau of the Balaghat district, north eastern hilly terrain of the Bilaspur district, the Manipat plateau of the Surguja district, the Jashpur highlands of the Raigarh district, the Baidadila range of the Bastar district, the Seoni Sub-division of the Chhindwara district and also in the Durg district. The following is the estimate based on recent investigations of the reserves with 50% or more  $\text{Al}_2\text{O}_3$ :-(1)

Table No. 57 Showing reserves of bauxite in M.P. (with 50% or more  $\text{Al}_2\text{O}_3$ ).

<u>Districts</u>	<u>Reserves (Tons)</u>
1. Surguja-Jashpur-Bilaspur	6,374,000
2. Balaghat-Mandla-Kawardha	2,135,000
3. Bilaspur-Shahdol (Amarkantak area)	620,000
4. Jabalpur	525,000
<u>Total</u>	<u>9,654,000</u>

The reserves of bauxite containing less than 50 per cent of alumina is expected to be several times the above total.(2)

In spite of the fact that quarrying for bauxite started

(1) Brown and Dey, op.cit., p.260.

(2) Ibid p.259



in the Katni in 1908, much earlier than in any place in India, most of the ore is exported to other States in raw form. The important importers of the ore are the aluminium factory at Asansol (near Calcutta) and the alum works in U.P. and Bengal. Only a small quantity is used in the State in the manufacture of fire-bricks.

Production at the moment is hampered by want of means of transport and the only deposit that is being worked is near Katni. Admost the entire quantity mined is despatched to Petroleum refineries and this demand has received a fillip during the last couple of years when the Bombay refineries went into operation. Only a small quantity is locally treated to produce the refractories.

There are multifereous uses of aluminium and in the future economic development of India its importance is next to iron and steel. There will doubtless arise an enormous demand for aluminium utensils as the first result of any increase in the standards of living of the masses who at present are using earthenwares, more especially as copper and copper alloys are expensive and India is short of copper.

The only imported<sup>raw</sup> material required for the manufacture of aluminium metal is cryolite which can be produced locally by synthetic methods. The other thing required is cheap power. If the Rewa Project, which is only 76 miles from

Katni, is completed, Katni can develop a flourishing industry.

At present there is no grading of bauxite ores. It is suggested that high grade bauxite ores are to be reserved for the manufacture of aluminium, and inferior ores are to be used in other industries. The following new industries can be visualised: alumina, aluminium and alum. It is now planned to establish an aluminium ingot factory at Borba or elsewhere when the Chirimeri-Barwadh rail link, now under construction, is completed and cheap electric power is available from the Hasdo River Project.

Even the fringe of the potential market of aluminium has not been touched yet and if it can be made cheap enough by eliminating uneconomic methods and waste in taking raw materials over long distances by rail to the reduction works, the future seems assured. At present the bauxite has to be taken hundreds of miles by rail from Katni to Asansol where it is refined into alumina and either reduced to aluminium there with thermal electricity, or sent over a thousand miles by rail to a reduction works at Alwaye in Travancore employing hydroelectric power. The obvious solution is to develop hydroelectric power near where both coal and bauxite are available in close proximity, if this is possible, as in Katni.

2. Aluminous Refractory Material. The three minerals sillimanite, Kyanite and andalusite are all silicates of aluminium having the same chemical composition  $Al_2O_3 \cdot SiO_2$  but differing in physical properties. For most refractory purposes they are adequate raw materials in the manufacture of fireclays, i.e., silica bricks. Besides other areas, sillimanite deposits of commercial importance occur in Bastar (1). Minor deposits associated with sillimanite-tourmaline rocks are found near Pohra, Bhandara district. It has been worked in a small way from near Bhandara, from mica schists and fine-grained tourmaline rocks. On occasions a few tons of corundum are also won from these mines. The deposits near Khawasa and Kheriapal are reported to be unworkable at present.

The attention given to Kyanite resources of Bihar has not been applied to other regions. But it is known that impure Kyanite-topaz-dumortierite rocks occur at several places in the Bhandara district, near Dighori and between Dahegaon and Jurjar though they are not considered to be workable.

3. Copper. The copper ore, mentioned earlier in connection with the barytes deposits deserves more

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(1) Brown and Dey, op.cit., p.418.

*Table No. 58 Showing the production of copper ore in India*

attention. In this State copper ores occur in Sleemanabad, Niwar (Jabalpur district) and Narsinghpur. The Sleemanabad veins are found in dolomitic limestone. Near Sleemanabad the veins were prospected between 1904 and 1908, and again in 1937 when it was proposed to use the ore for the manufacture of copper sulphate. The information regarding the size and extent of these veins is lacking (1). In several places near about Niwar veins of copper ore have been found (2).

On the surface the veins are not very persistent but deep boring may prove workable deposits.

Silver and galena also occur in the same lode.

Azunte and malachite occur in certain schists and were mined in the last century. These mines have been abandoned but may deserve closer re-examination as the yield of copper from some early samples is reported to have averaged as much as 28%.

It may not be out of place to mention here that the production of copper ore in India has gone down during the first three years of the First Five Year Plan as is shown in the following table:(3)

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(1) Second Five Year Plan, op cit., p. 378

(2) Ibid. p.378

(3) Ibid. p.378

(4) *Records, Vol. 74, pt.3, op.cit., p.415.*  
 (5) *Krishnan, Rec. G.S.I., Vol. 86, pt.2, 1955, Calcutta*  
*1955, op.cit., p.333.*

Table No. 58 Showing the production of copper ore in India  
(Figures in 000 tons)

<u>1950</u>	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>
360	369	325	238	343

4. Lead. Several occurrences of lead ore are known from Madhya Pradesh, the most important of these being in the Archaean rocks. Of these the best known is from Ranitalao near Chicholi in the Durg district. The ore occurs in quartz veins, 6-30 ft. in width, and has been traced for  $1\frac{1}{2}$  miles through gneisses. It contains flour-spar, but is not rich enough for modern industrial purposes even though it yields over 9 ounces of silver per ton of lead (1).

Other localities known are at Thelkadand and Karamtara in the Durg district. In association with copper lodes argentiferous galena is found at Sleemanabad in the Jabalpur district. It has also been reported from Bhelaunda and Chirai Khurd in the Surguja district.

The best known deposits at present is of Zawar area in the Udaipur district of Rajasthan and the rest in India are too small for economic production (2)

IV Precious Metal. It is of no importance.

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- (1) Krishnan, Records, Vol. 74, pt.3., op.cit., p.415.  
 (2) Krishnan, Rec. G.S.I., Vol. 86, pt.2., 1955, Calcutta 1955, op.cit., p.353.

Gold. The only localities where gold has been worked in situ are Sonakhan in the Bilaspur district and Sleemanabad in the Jabalpur, where gold was found in the copper ores. None of these deposits are being worked now and detailed investigations are called for (1). Alluvial gold, on the other hand is still obtained in a small way from river beds, but the aggregate yield is insignificant. Alluvial gold has been obtained from the districts of Balaghat, Bastar, Bhandara, Bilaspur, Jashpur, Mandla, Raipur, Seoni and Udaipur. Collection of alluvial gold is not a whole time business and workers attend to it as only part time engagement.

#### V. Minerals used in Ceramics, Refractories and Glass Manufacture.

Madhya Pradesh is very rich in various types of clays and sands required in ceramics, refractories and glass manufacture.

1. Ceramic Clays. Pottery and fireclays are known from the Gondwana formations all over the country and are extensively worked. The stoneware and firebrick industry of Jabalpur is well known. The white plastic clay is available there in almost unlimited quantity and the total extraction from this area alone was 38,870 tons in 1950. The Jabalpur potteries obtain their supplies from near the town. Another area where white clays are found is in the Chhindwara district.

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(1) Mineral Resources of C.P. and Berar, op.cit., p.253.



Similarly clay is known from Amdari near Chanda, on the northern flanks of the Satpuras and near Achalpur and at Bagra.

The clay beds may reach a thickness of up to 10 ft. e.g., near Muria. White clays from near Hithapathar in the Durg district is reported to be of very good quality, and is also known from several localities in Durg district, particularly from Bhandaritola, Arjouni and Bhooritula. Similar clays also occur at Bamori, in Murwara and at Kukrainala.

Decomposed gneisses are sometimes washed and the clay is allowed to settle down. This mining has, however, been sporadic and on a small scale due to high cost of working and the unavoidable presence of some impurities. Such material is, therefore, only suitable as filling in rubber, paper and cloth industries. The 'lithomarge' (White compact, impure clays) from Tikaria, in Katni-Marwara is reported to make excellent tiles and bricks though not for refractory purposes.

The production of China clay in India has doubled during the five years ending 1948 (1), Madhya Pradesh with 27.3% of the total output of India topped the list 20 years ago since then other States have increased their production and during the five years ending 1948, Madhya Pradesh

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(1) Brown and Dey, op. cit., p.374.

dropped to third producer with 11.0% of the total output of India (1).

2. Graphite. A small amount of graphite was being mined from certain localities of India, but by 1912 graphite mining came to extinct. The First War (1914-18) stopped the supply from foreign countries with the result that it allowed the opening of deposits of India. In 1920 and 1921, Betul produced 47 tons of graphite. From 1934 onwards the production decreased but became more regular. There had been an increase in all-India production from an annual average of 459 tons in 1934-38 to an annual average of 856 tons in 1939-43.(2) From 1934-43, Madhya Pradesh contribution was 15% of the total output of India (3). During 1945-50, Madhya Pradesh produced 22% of the total output of India.(4) The deposits of graphite in Madhya Pradesh are located in the district of Betul. About 3 miles north of Betul in a zone of Carbonaceous phyllite is a deposit of graphite, the western end of which has been recrystallised to graphitic phyllite. Bands ranging up to 10 ft. in width, in which the graphite contents range up to 18 to 30% of the rock have been prospected and worked.

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(1) Brown and Dey - op cit. p. 374.

(2) Ibid. p.438

(3) Ibid. p.438

(4) Ibid. p.438

3. Feldspar. This is the chief flux for ceramic wares. A large amount is used in the manufacture of glass. It is also required for enamelled wares. Accordingly it is in great demand. It is produced from pegmatite veins in the Chhindwara and Jabalpur districts. The Jabalpur quarries, situated at Lameta Ghat, have been in operation since 1904. The quarries have not only supplied the products to the Jabalpur potteries, but exported to other States of India, in both processed and semi-processed condition. Since 1941 at Bargan and since 1948 at Lodhikhera in the Chhindwara district feldspar is being quarried.

Total reserves are estimated to be considerable, but mining difficulties hamper progress. The production of feldspar ore during 1934-8 was mainly from Rajasthan and Ajmer-Merwara, contributing 90% of the total output of India. During 1944-48, Madhya Pradesh topped the list with 42.1% of the total production of India, followed by 36.6% by Rajasthan (1).

4. Steatite. There are several localities in Madhya Pradesh, from which steatite (talc, soapstone, potstone) is being quarried. But of all the localities, the best known is that of the Marble Rock near Jabalpur. Here is a group of quarries in and about the village of Bhedaghat.

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(1) Brown and Dey. op. cit., p.388.

The mineral occurs in the Dharwarian dolomites. The colour varies from white to pale sea-green. Other areas of less importance are Gowari, Lalpur and near Rupaund in the Jabalpur district, Bhandara district, Jambal Ghat (Chanda district), and near Kilekora (Durg district).

The deposit of Kilekora is now largely exhausted, but still it supports a flourishing cottage industry which is engaged in the manufacture of household potstone utensils.

According to the Director of Geological Survey of India, no estimates have been made of the reserves of this mineral in India (1).

In 1954 Madhya Pradesh produced 2,390 tons of steatite out of the 42,326 tons produced in India. But out of this gross output Rajasthan's contribution was 31,367 tons. The following are the output of the ore during 1951 to 1954 (2).

Table No. 59 showing the output of steatite in Madhya Pradesh (Figures in Tons)

<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>
1,413	1,321	1,754	2,390

A small quantity of this ore is exported and the rest is consumed within India itself. The export in 1952 was 4,060 tons against 5,344 tons in 1951. It is thought that India can meet her demand of this mineral locally (3).

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- (1) Director G.S.I. - Mineral Production of India during 1954 Indian Minerals, Vol X. No. 1., Jan, 1956, p.41.  
 (2) Rec. G.S.I. Vol. 86, pt.2. 1955, p.374 and Indian Mineral Vol X No. 1. Jan, 1956, p.41.  
 (3) Rec. G.S.I. Vol 86, pt.2. Calcutta 1955, p.375.

The present uses are in paper mills, rubber works, cable companies, chemical works in making soap and toilet powder, etc. Besides the above a large quantity is utilised in making cooking utensils, pots, carvings, etc..

VI. Mineral Colours and Abrasives. Baryte deposit of Madhya Pradesh is poor in quality and is confined to one locality, Sleemanabad (district Jabalpur). It occurs in the copper load. The present output of ochre is from Akola, Betul, Chanda, Hoshangabad, Jabalpur and Nagpur districts. Though widely distributed, ochres of good quality and colour and free from gritty matter are often rare.

1. Barytes. From 1918 till 1949 almost 92% of the barytes produced in India, came from Andhra, about 7% from Rajasthan, and very negligible percentage from Madhya Pradesh, Kashmir, Vindhya Pradesh and Manbhum in Behar. (1)

Barytes are known to occur in the copper load at Sleemanabad in Jabalpur district, but quality is said to be poor. The copper load also has not proved very encouraging and consequently it cannot, at present, be obtained as a by-product either.

The most important problem for immediate attention is

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(1) Brown & Dey, op.cit., p.448

Table No. 61 Showing the output of barytes in India. If it is not done the white barytes reserves of Andhara will be exhausted quickly. (1) It is important to investigate the problem of producing better-quality products from the tinted, off-colour varieties of barytes, if India wants orderly development of her industry.

2. Ochre. Ochres are used in pigments in a number of industries as well as in the decoration of houses and temples and for many other purposes. It is in great demand in India. It is found in the districts of Chanda, Durg, Hoshangabad and Surguja. With the industrial expansion, the output of ochre has gone up as will be shown from the following table: (2)

Table No. 60 Showing the output of ochre in India

(Figures in tons)

<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>
11,292	17,600	59,631	75,506

Pradesh

Out of the output of the Indian production, Madhya/ supplied the following quantities:

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- (1) Brown & Dey, op.cit., p.452.  
 (2) Rec. G.S.I. Col. 86, Part 2, 1955, p.366 and Indian Mineral, Vol. X., No.1, Jan 1956, p.36.



Table No. 61 Showing the output of ochre in Madhya Pradesh -  
( Figures in tons. )

<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>
4,321	6,319	3,451	5,079

It will be noted that while output in India has increased to about seven times of 1951 production, there has been a fluctuation of the output in this State.

Ochres are very widely distributed, but of good quality and colour and free from gritty matter are often rare. In Madhya Pradesh there are many localities producing both the red and yellow varieties.

The red variety is mined in Jauli (Jabalpur), Gondai and Thakurtola (Durg) and the Salitekri hills (Balaghat) from Dharwar rocks. Yellow ochres are said to be found in the Chada district and near Kalmeshwar in the Nagpur district.

The present output is from Akola, Betul, Chanda, Hoshangabad, Jabalpur and Nagpur districts.

The whole of the output of the mineral is consumed in India for industrial purposes, indigenous medicines and on some occasions of religious ceremonies.

India imports paint and paint materials in large quantities in spite of the fact that she possesses all the raw materials required to develop this industry. Besides linseed and lac, mineral substances used by the paint-maker such as barytes,

bauxites, gypsum, whiting, kaolin, mica, etc., are available in India and which are vastly superior to those of many countries from which these imports are derived. If India develops this industry, she can become an exporter of paints and varnishes rather than remain an importer.

Madhya Pradesh is suitably situated within the reach of the raw materials and she should take the initiative to develop this industry.

VII. Building Materials and Road Metals. A very large variety of material is covered under this heading and India has been self-sufficient in most of these. In fact there have been occasions when small quantities were exported, and some Indian ornamental stones have been found in ancient temples in Europe.

There are great varieties of materials which can be used for building purposes in Madhya Pradesh and are found in abundance in all geological formations. (1)

Thus the State has been entirely self-sufficient in all varieties of building material, from the common brick, to the beautiful marbles of Jabalpur and Chhindwara, and on to cement. It is not possible to describe in detail all the varieties available in the State within the

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(1) Krishman: Records, G.S.I., Vol.74, Pt.3, 1939, op. cit., p.395.

limited space at **the** disposal. Therefore, a brief description of important materials follows.

The alluvial deposits of all big rivers of the State along with many of the smaller rivers yield excellent brick clays. In the tracts of older alluvium Kankar is in abundance. The Deccan Trap and the laterite have been commonly used for building stone, and the former is, unquestionably, the finest road metal obtained anywhere in the country. The Lameta or Infra-trappean limestones are found in many parts of the State, e.g., in the Satpura and in Nagpur and Chanda (Karamgaon). They constitute an excellent ragstone and are good for bridges. The Lameta sandstones also provide good building material.

The Geological Survey of India in Madhya Pradesh during 1942-51, made a survey of some important minerals of the State and gave the following estimates of the limestone deposits. (1)

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(1) Census of India, Vol. VII, M.P. Part IA - Report. **Part II**, Appendix C, Table II, p.299.

Table No. 62 Showing the estimates of limestone deposits in M.P.

District	Region or Locality	Reserves if Estimated (in Tons)	Remarks
1. Amravati	Chikalda Range	... (a)	Inferior, suitable for lime-burning
2. Bilaspur	18 Deposits	44,379,600	Mostly suitable for cement industry
3. Durg	32 Deposits	20,998,350	Mostly suitable for cement industry
4. Raipur	25 deposits	17,256,900	Mostly suitable for cement industry
5. Nagpur	Chicholi	... (a)	Inferior quality
6. Yeotmal	Wun Tahsil	... (a)	Fairly good quality

(a) Estimates not available.

The above table shows that deposits of limestone suitable for cement industry are more than 83 million tons, besides deposits of inferior or fairly good quality.

From the Upper Gondwana of Jabalpur group are quarried clay suitable for pottery purposes and also fire-clay and pipe-clay. Sandstone is obtained from Lower Gondwanas at Bhutara hill and Isapur in the Chanda district, Silewada near Kamptee, Akhund in Nimar and Ellichpur in Amravati. The Pachmarhi sandstone is also a good building stone.

The Vindhyan formation, well known for its uniformity, had yielded excellent flagstones, and perhaps more of it had gone into the construction of ancient forts and palaces than material yielded by any other formation. This formation is a source of good building stones, in providing red, yellow and buff sandstones. The finer grain varieties yield beautifully to intricate carving, and in the hand of patient, laborious artisans, has produced fascinating designs for ventilators, doors and even jewellery and trinket boxes. In places it yields such thin flags that it can be used for roofing too. The Vindhyan limestone is used for lime burning and is admirably suited for cement. It is, accordingly, being extensively quarried, and the industry is likely to grow in years to come. (More material polished ornamental stone.)

on limestones will be dealt with under separate sub-heading in the following pages.)

The Raipur limestones are extensively used for building purposes. A dark bluish limestone from Sikosa in the Durg district has been extensively used for flooring in buildings at Nagpur. The Pem or Penganga limestones are said to yield good building stone in places in the Chanda district.

The Marble Rocks in the Jabalpur district are known for their scenic beauty and they have yielded some excellent ornamental stones too. Other well known localities are in the Betul, Chhindwara and Nagpur districts and Seoni sub-division. A pink marble from Narsinghpur has been widely used. Beautifully marked seprentine marble is known from Sausar Tahsil in the Chhindwara district. Gneisses are usually not considered desirable for building purposes, as the cost of working them is beyond the capacity of the common villagers. But considerable reserves of some beautiful varieties are known and have, on occasions, been worked on a small scale.

A very pure quartzite, suitable for crushing for glass sand, occurs in large masses near Kishanpur. In the Archaean tracts of Madhya Pradesh there are also wide stretches of gneiss and granite, many of which would form excellent polished ornamental stone.



It is not possible to comment on the quarrying industry as the statistics available are "incomplete and thoroughly unsatisfactory". (1) There is an urgent need for fundamental revision of the statistical basis of this valuable branch of the mineral industry. Without necessary and accurate information the orderly development of the great resources of this branch of industry is gravely hampered. The sooner it is done, the better for the prosperity of the industry.

VIII. Miscellaneous Minerals. These mineral deposits are not of all-India importance at present as the known reserves are not of high order.

1. Asbestos. The Indian deposits belong to tremolite and actinolite species of the Amphibole asbestos group, generally. Often the fibres are of considerable length but they are usually too weak and brittle for spinning. They possess good insulating and acid-resisting properties. (2) Asbestos has been produced in the past in small quantities from Tumkhera Khurd, Bhandara district. Total amount produced over a number of years till 1925 was 84 tons of asbestos. (3) There has been no production since

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(1) Brown & Dey, op.cit., p.312.

(2) Ibid., p.534.

(3) Ibid., p.535.

1925. Other deposits are known from near Sagar, Sanoda and Bachai, but these are yet to be investigated in detail. In connection with the increased need for asbestos cement the Provincial Industries Committee, C.P. and Berar, has recommended the discovery of "fresh deposits of asbestos by an intensive survey of the province." (1)

A large quantity of asbestos goods is imported. Many of these goods are manufactured from shorter grades and less valuable fibres. These can be made in India, provided the machinery employed for the purpose is adopted.

In the past too much attention has been paid to the length of the fibres, while 99% of the Canadian output is from veinlets under three-eighths of an inch. The commercial value of asbestos depends less on length than on such properties as tensile strength, fineness, flexibility, colour, heat and electrical resistance.

2. Fluorite. Fluorite is widely distributed in small quantities, but unfortunately workable deposits are confined to a single locality in India. This appears to be promising. Here is a series of low ridges, traversing the borders of Nandgaon and Kharagarh. They contain fluor-spar along with grains of feldspar and pyrite. The deposits are estimated to be 104,000 and 46,000 tons, respectively. (2)

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(1) Report, Industries Committee, 1945, op. cit., p. 33.

(2) Brown & Dey - op.cit., p.556.

Production during 1939 and 1946 was about 9,000 tons in Khairagarh.

There are several quartz veins with flourspar at Churakuta, Ghatka Chhar and Makarmuta, in the Mahasa mud tahsil of the Raipur district. Still other occurrences, which are more of mineralogical than of economic interest, are found in Madhya Pradesh. One of them is in Malahar, Murwara tahsil, Jabalpur district, and the other is associated with lead and copper ores at Sleemanabad, in the same district.

The demand for flourspar will rise with the expansion of steel and aluminium industries and with the development of chemical industries and for other purposes. Unfortunately India is short of this important mineral and depends on the imported supplies. There should be a systematic underground exploration of known deposits, such as those of Khairagarh and Nandgaon.

3. Fuller's Earth. This is used on a large scale in the clarification of mineral and vegetable oils, from which it removes objectionable colours and other impurities. The other uses are in the paint and colour trades, as ingredients of soap, fillers of paper, and in the manufacture of refractory cements.

Fuller's earth is being raised from the Lower Vindhyan rocks at Katni, in the Jabalpur district. The production

was about 350 tons in 1922, but declined soon after. For the period of three years, 1947-1949, Madhya Pradesh produced only 36 tons. (1)

4. Mica. India is the largest producer of muscovite block mica and mica splittings and supplies 80% of the estimated world demand of dressed mica-blocks, condensers and splittings. (2) Though no workable deposits of the common mica are known from the State, two occurrences of Lithia Mica (lepidolite) have been known from near Mundel in the Bastar district. The first deposit is about 400 yards south of Mundel and extends for several hundred yards. The second occurrence is 600 yards south by west of Mundel on the face of a hill. It occurs in a pegmatite dyke which is 30 ft. wide and over 70 yards long, the central 15 ft. of the width being rich in the material. It is estimated that several hundred tons of the mineral are available.

Since there has been a good supply of mica from Bihar, Madras and Rajasthan, no attention has been paid to explore the possibilities of deposits at other places. With the expansion of electricity, the demand on mica will rise rapidly. It is advisable to make a detailed survey of this mineral in the State.

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(1) Brown & Dey, op.cit. p.552.

(2) Director G.S.I., Indian Minerals, Vol. X., No.1, Jan. 56, p.36.

5. Sodium Compounds. From the Lonar Lake (Buldana district), sodium carbonate was extracted for centuries till 1930, when operation ceased. In 1930, the production was 100 tons. (1) The lake is situated in the Deccan Trap basalts. Though views, regarding the origin of the circular crateriform hollow differ, it is probably of volcanic origin. According to the estimates made by Chritie in 1910, it contains about 2,000 tons of sodium carbonate along with 4,500 tons in the upper  $1\frac{1}{2}$  metres of the mud. (2) The following is the composition of the matter from which 6 varieties of salts are prepared. (3).

Table No. 63 Showing the composition of salts in the Lonar Lake.

$\text{Na}_2\text{CO}_3$	46.90 to 11.67%
$\text{Na}_2\text{HCO}_3$	33.18 to 8.58%
$\text{NaCl}$	Nil to 71.11%

6. Gemstones. Diamonds were formerly obtained near Wairagarh in Chanda district. But since 1843 the workings had been abandoned. The gems were obtained from a lateritic grit, and it is believed that the original source of the diamonds was in the Cuddapah rocks of this area.

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(1) Brown & Dey, op.cit., p.517.

(2) Ibid., p.517.

(3) Rec. G.S.U., Vol, 74, Pt. 3, 1939, op.cit., p.423.

Ibid., p.627.

Agate and carnelian, members of the chalcedony group, are collected from the amygdaloidal lava flows of the Deccan and Rajmahal traps, or from river beds draining them. The stones reach the lapidaries in such centres as Jabalpur. Onyx, with banded red and white sardonyx are to be obtained in Jabalpur. Many kinds of jasper, ideal for seals and signet rings, dark green, brilliant red and bright yellow, occur with onyx. Banded rock jaspers are common in the Dharwar and Bijawar formations throughout the Peninsula. Amethysts are obtained, though rarely, from the drusy/geodes of both the Deccan and Rajmahal Traps. Rose quartz is found in the Chhindwara district. Sir Lewis Fermor thinks that from this area a large quantity of rose quartz can be collected easily. (1) Loose blocks of amethystine and pink quartz can be obtained from Chhindwara. According to S. K. Chatterjee, green quartzite form two ridges which pass through Mahalgaon in the Bhandara district. (2) Quartz, as a by-product of quarrying operations in pegmatites, is obtained from the Lamete Ghat, Jabalpur district.

These gemstones are obtained from geodes in the Trap. They are not worked directly, mainly because the deposits are not extensive but scattered all over the basalt-covered areas,

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(1) Brown & Dey, op.cit., p.627.

(2) Ibid., p.627.



and are obtained from river beds. A flourishing lapidary industry exists at Jabalpur. No records of the quantity or value of gems passing through their hands is, however, available.

Conclusions. Important minerals found in all three natural divisions of the State (East, North-west and South-west) are coal, Manganese and limestones. Alluminium, asbestos, barytes, ceramic clays, lead, ochre and steatite are common in East and North-west M.P. Fluorite, iron, lignite (in small quantity) and mica are found only in East M.P., and copper (in small quantity), feldspar, fullers earth and graphite only in North-west M.P. As far as regional concentration of mineral goes, about 31.4% of the area of the State (the western portion) is more or less devoid of minerals. In Berar districts limestone is found, in Akola and Yeotmal and coal in the Yeotmal district. The other two (Amravati and Bulda) have no minerals. Betul has only some graphite, Hoshangabad, Coal, copper and ochre and sagar some asbestos, and Wardha and Niwar no minerals at all. The whole of the above area is poor in minerals. The regional grouping of minerals are:

1. Chanda-Bastar-Durg-Raipur region.
2. Chhindwara-Nagpur-Bhandara-Balaghat region.
3. Jabalpur region.
4. Maudla-Belaspur-Raigarti-Surgiya region, and
5. Akola-Yestmal region.

The most important mineral region is Chanda-Bastar-Durg-Raipur. Here can be developed basic industries - iron and steel (Bhilai Iron and Steel project which will go into production by the end of 1959, is located in this region), Aluminium, and industries based on limestone. The possibilities of exploiting lignite (Raipur district) can be explored. Ceramic industry can also be developed. The second region, Chhindwara-Nagpur-Bhandara-Balaghat, can develop the industries based on manganese and limestone and also aluminium. The third, Jabalput region, can have alluminium and ceramics and industries based on limestone and mangnese. There is some copper, its possibilities can be explored. The fifth and the last, Akola-Yeotmal region, is the least important one, only aluminium is found there. All the mineral regions can have power from either the local thermal station (every region has coal deposits) and from the proposed Grid Scheme and later can be supplemented with hydroelectric power when available.

The estimates of minerals given by different authorities and different sources, differ from each other to a very great extent. This is due to the incomplete survey of economic geology of the State. Since India has decided to develop her industries and exploit her mineral resources, it is desirable that she pays due attention to have complete geological survey.

Coal is mined by wasteful methods. To make the maximum advantage, there should be rationalisation of coal mining and wasteful methods should be eliminated.

There is shortage of coking coal, not only in M.P. but in the whole of India. It is necessary in the interest of iron and steel industry to conserve the coking coal of the Mahanadi and the partially coking coal in the Pench Valley.

To develop the mineral industry (and for that matter all industries), power is an essential pre-requisite. Hence, the Government should give top priority to power development projects, both thermal and hydroelectric.

The key minerals, coal, iron, manganese and bauxite should be developed and controlled by the Central Government from the point of view of investment and strategic importance and also in the interest of a nation wide economy.

necessities..."(2). In 1870, a few years after the annexation by the East India Company, this State (then Barer) was exporting principally cotton, grain, wheat, cloth, lac, spices and groceries, with rice, oil and "ghee" (clarified butter). The principal imports

(1) Report on the Industrial Survey of the Central Provinces and Berar 1935-36, Volume I, 1936, p. 13.

(2) Ibid, p. 13.

## Chapter VIII - Industries

(Figs.76-81)

In the pre-British period in India industries grew around the palaces and seats of governments, the Kings, nobilities, courtiers being great patrons of arts and crafts. Thus the industrial towns of those days were Lahore, Delhi, Lucknow, Murshidabad, Dacca, Hyderabad, Mysore. In M.P. "the only exporting centres were Burhanpur (District Nimar) and Nagpur and its neighbourhood, where the existence of native courts had led to the establishment of important industries...." (1) According to the same Survey Report, during that period "every part of the province was practically self-sufficing in point of most manufactured necessities..."(2). In 1870, a few years after the annexation by the East India Company, this State (minus Berar) was exporting principally cotton, grain, native cloth, lac, spices and groceries, silk cocoons, dyes and "ghee" (clarified butter). The principal imports

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(1) Report on the Industrial Survey of the Central Provinces and Berar 1908-09, London 1910, p.15.

(2) Ibid, p.15.

during that period were salt, sugar, English piece-goods, tobacco, spices, silk pieces and coconuts. (1) During the same period the important manufactures of Berar were cotton cloths, carpets, Indian saddles, silk-weaving, dyes, carpentry and iron-smithing. (2)

How within a short period of 17 years (the Nagpur State lapsed to the British Government in 1853) the whole economy of the State changed is set forth in the Gazetteer of 1870, which describes how the relatively self-sufficing domestic economy, in which villagers produced their own needs, was rudely challenged by a trade economy, where they became subject to outside competition. (3) Further it says, "The native cloth manufacture has been severely tried by the development of the cotton trade. In the first years of scarcity, cotton became almost too precious to be worked up into the coarser native fabrics, and the weavers were undersold by the Manchester Manufacturers even in their own villages." (4)

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1. The Gazetteer of the Central Provinces, 2nd Edn., Nagpur 1870, P.cliv.
  2. Gazetteer for the Harderabad Assigned Districts, Commonly Called Berar, Bombay 1870, p.237.
  3. The Gazetteer of the Central Provinces, 1870, op.cit. p.c.l.v.
  4. Ibid., p.c.lii.

This was the situation in the seventy of the last century. In the first decade of the present century the principal manufactureds in Madhya Pradesh (less Berar) were "silk weaving, cotton weaving, cotton dyeing and printing, gold and silver work, brass, copper and bell-metal works, and the making of glass bangles.(1) But the industries were "as a rule not in a prosperous condition, owing to the competition of more highly organised methods of manufacture and to changes in fashion. (2) In the same decade, the manufactures of Berar were "chiefly confined to twist and yarn, coarse cotton cloth, and the production of unskilled craftsmen."(3)

In 1903-04, there was only one spinning and weaving mill in Berar, located at Badnera (District Amravati) with 248 looms and 16,336 spindles and employed 882 hands. Against it, there were 153 ginning factories and 59 steam presses.(4) In the same year, the Central Provinces had 7 textile mills (2 each at Nagpur and

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- (1) Imperial Gazetteer of India, Central Provinces, Calcutta 1908, p.59.  
 (2) ibid, p.59.  
 (3) Imperial Gazetteer of India, Berar, Calcutta 1909, p.36.  
 (4) ibid, p.36.

(1) Imperial Gazetteer of India, C.P., 1908, op.cit., pp.61 and 62.



Hinganghat (District Wardha) and one each at Jabalpur, Pulgaon (District Wardha) and Raj-Nandgaon (District Durg) ). Against this there were 100 cotton ginning and 47 pressing factories.(1).

The brief economic survey has been made in Chapter I, where it has been shown that there has been progressive dependence on agricultural and proportionate decrease in industry.

In Madhya Pradesh, as all over India, most of the industries are produced by 4 different sectors - large scale, small-scale, cottage and hand crafts. There is conflict of interest among the sectors. Each wants to eliminate the others. Large-scale industries are those which are organised and centralised and which come under the Factories Act, 1948. According to that Act, a factory means a place where ten or more persons work with the aid of power or twenty or more persons without the aid of power. Various authorities tried to define and differentiate between large-scale, small scale and cottage industries. But there is no satisfactory definition. The National Planning Committee, under

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(1) Imperial Gazetteer of India, C.P., 1908, op.cit., pp.61 and 62.

the chairmanship of Pandit Jawahar Lal Nehru (All India Congress sponsored body) defined:

"Cottage Industries may be those which have:

"(1) No mechanical power and no hired labour

"(2) No mechanical power and hired labour under 10 persons

"They may possibly also be:

"(3) No mechanical power but hired labour over 10 persons

"(4) Mechanical power under 10 B.H.P. but no hired labour

"Small scale industries may be (3) and (4) as in cottage industries and also

"(5) Mechanical power under 10 B.H.P. and hired labour

"Large scale industries will generally be:

"(6) Mechanical power over 10 B.H.P. and hired labour

"Large scale industries may also include (3) and (5) above...." (1)

But the committee had to accept that "This method of considering this question leads us again to overlapping. Specific cases or industries have to be considered separately in order to determine whether they should be considered large-scale, small-scale or cottage." (2)

Agrawal coined his own definition and says that "cottage industry stands for all those industries which are worked by artisans in their homes, or at some other

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(1) Rural and Cottage Industries, Bombay, 1948, p.53.

(2) Ibid, p.53.

place in the same locality with the help of the members of their family or with a few labourers (the total number not exceeding nine), irrespective of whether power and machinery are used or not". (1) This definition is also defective and open to grave criticism.

Towards the end of 1954, the Government of India constituted the Small Scale Industries Board which tried to define the term 'small scale industries' at its various meetings. It had to admit that "It has not been found possible to set a hard and fast definition of this term. For practical purposes, however, units employing less than 50 workers if using power, or less than 100 persons if not using power, and having a capital of not more than Rs.5 lakhs (₹37,500) are treated as small scale industrial units....."(2).

In Madhya Pradesh all the four sectors are in operation. In most of the cases the three sectors (large scale, small scale and cottage) operate simul-

(1) Agrawal, A.N. - Industrial Problems of India, Delhi 1952, p.135.

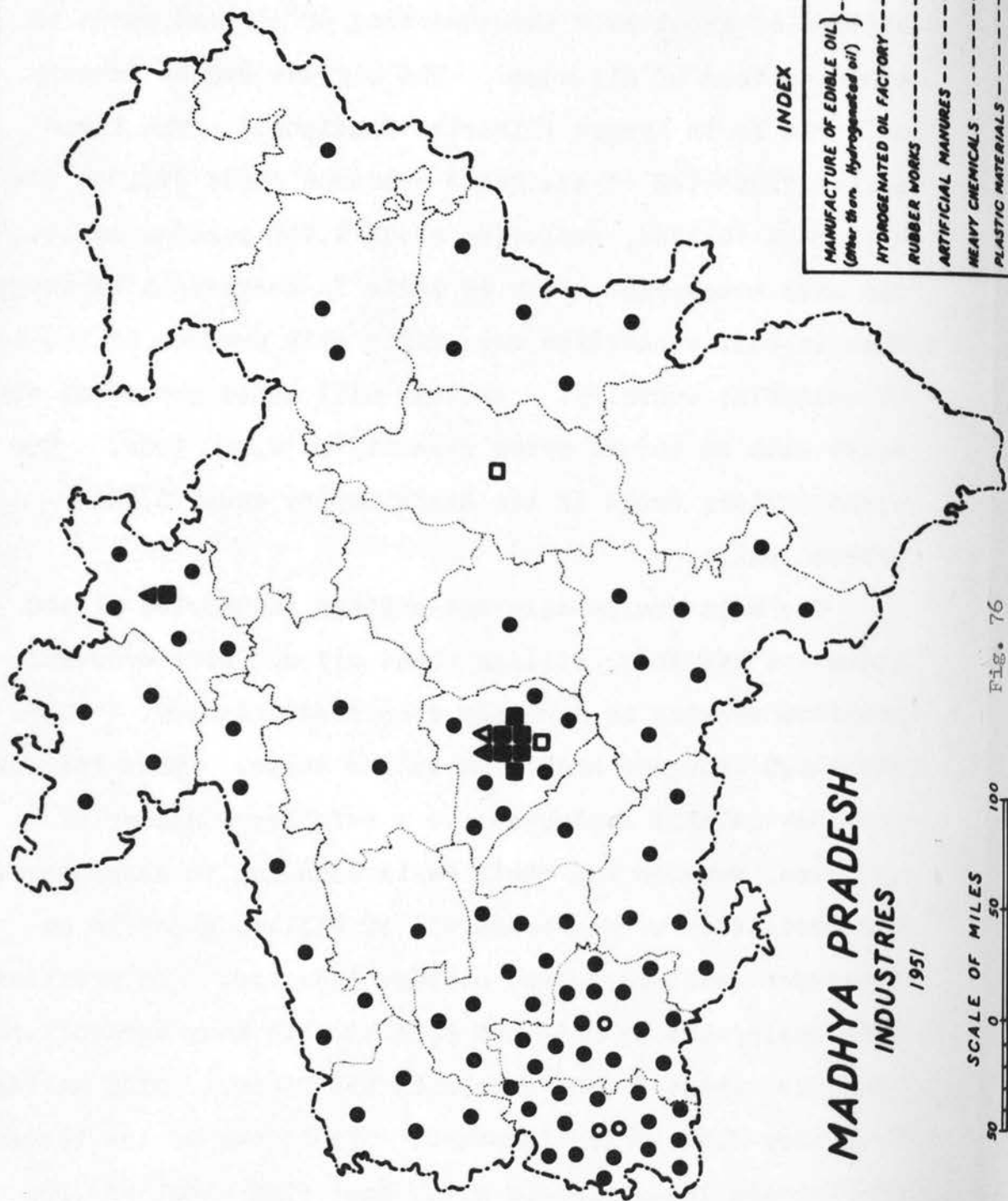
(2) Journal of Industry and Trade, Vol.VIII No.8, August 1957, New Delhi, p.1279.

taneously and in some all the four. There is a conflict of interest among the first three sectors and each wants to eliminate the other two. The Central and States Governments are trying to co-ordinate their activities and evolve a common programme.

The main large-scale industries in the State are cotton textile, cotton ginning and pressing, vegetable oil, cement, paper and newsprint, and potteries. Cotton textile is the most organised and is mainly concentrated in the cotton growing districts of the State. It is the largest employer of labour in the State, employing about 30,000 persons daily. The number of spindles and looms are 374,130 and 7,394, respectively. The expected production of cloth in 1957 was about 450.2 million yards. There has been a rapid increase in the number of ginning and pressing factories by steam power. From 4 in 1887-8, the number increased to 325 by 1951. They are mainly concentrated in the cotton districts. The manufacture of vegetable oil is one of the very oldest industries of India. Recently there has been a shift of the industry from village to big towns and cities. There are 90 mills located in the State with an annual pro-

duction of about 58.8 thousand tons of oil and about 98 thousand tons of oil-cake. The biggest cement factory of India is in Kymore (District Jabalpur). The three cement factories of the State produced about 370,000 tons of cement in 1954, employing about 4,700 persons daily. The only news-print mills of India is located at Nepanagar. When in full production Nepa Mills will produce 30,000 tons of newsprint annually. Another mill makes paper and straw board with an annual rated capacity of 8,000 tons. The eight pottery works in the State employ about 3,000 persons daily.

The main small-scale and cottage industries of the State are handloom, village ghani oil and bidi concerns. Handloom weaving is a widely dispersed industry. There are about 168 thousand handlooms in the State. This industry provides gainful employment to a very large number of spinners, weavers and their assistants and to carpenters. The production of vegetable oil by village ghani is an important small-scale and cottage industry. It provides full employment to many and part time to many agriculturists. There are about 18,500 ghanis in the State. Bidi making is a very flourishing industry. It is one of the largest small-scale industries in M.P., employing about 200,000 persons and producing about 180 to 200 million of bidis daily. Besides the persons engaged in the manufacture of



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(Other than Hydrogenated oil)
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# **MADHYA PRADESH** **INDUSTRIES** 1951

SCALE OF MILES



Fig. 76



bidis, it gives subsidiary employment to agriculturists during off season by collection of tendu leaves.

## I. Food Industries.

The food industries of the State are confined to vegetable oil, cotton seed oil, vanaspati (hydrogenated oil), fruits and vegetable preservation and biscuits and confectionery. Of them the most important, at present, is vegetable oil. It is not only important for the State, or for all India, but for the world. Oilseeds and oil are great earners of foreign exchange for India. Madhya Pradesh, being one of the major producers of oilseeds, can help a great deal in earning foreign exchange. Cotton seed oil is being developed, and also had great future in the world market. Vanaspati and fruits and vegetable preservation may become of all India importance. Of them canned orange may also become of some importance in the world market. Biscuits and confectionery may remain of State importance.

1. Vegetable oil. (Fig. 76). The manufacture of vegetable oil is one of the very oldest rural industries of India. Its expansion during the last thirty years is remarkable. The factors responsible for the expansion are

the growing population, development of industries depending upon oil as raw material, and expansion of export to foreign countries. But with this expansion there has been a shift of the industry from village to big towns and cities, which has adversely affected the village oil industry.

Madhya Pradesh is one of the major oilseeds producing States of India having a dry climate in the north, cool and breezy in the plateau and wet and humid in the eastern parts. Rainfall ranges between 30 and 60 inches. The soil ranges from rich black cotton to light, sandy, red and yellow. The main oilseeds grown in the State are groundnut, linseed, sesamum, rape and mustard. The estimated average production of all oilseeds for the quinquennium ending 1953-54 was 275 thousand tons or 5.4 per cent of the all-India production (1).

Oilseeds are crushed in the mills driven by mechanical power or in village ghanis operated by bullocks and in power-driven ghanis in this State as in other parts of India.

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(1) Estimates of Area and Production of Principal crops in India 1953-54, Vol II, Delhi 1956, p. 30.

A. Vegetable Oil Mills. There are 90 mills manufacturing edible oil (other than hydrogenated oils) in this State, distributed as shown in the table below (1).

Table No. 64 showing the distribution of oil mills (other than hydrogenated oil) in M.P. in 1951.

<u>District</u>	<u>No. of Mills</u>	<u>District</u>	<u>No. of Mills</u>	<u>District</u>	<u>No. of Mills</u>	<u>District</u>	<u>No. of Mills</u>
Akola	14	Bilaspur	2	Hoshangabad	6	Raigarh	1
Amravati	9	Buldana	15	Jabalpur	5	Raipur	5
Betul	1	Chanda	8	Nagpur	7	Sagar	4
Bhandara	1	Chhindwara	2	Nimar	4	Yeotmal	6
Total							90

Of these 90, 49 are in the main groundnut growing districts of Akola, Amravati, Betul, Buldana, Nimar and Yeotmal; 20 in the main linseed growing districts of Bhandara, Bilaspur, Jabalpur, Nagpur and Raipur; and 19 in the main Sesamum growing districts of Chanda, Hoshangabad, Raigarh and Sagar. It is to be noted that there is no mill in the main rape and mustard growing districts of Bastar, Mandla and Surguja.

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(1) Large Industrial Establishments in India 1950 and 1951, op. cit., pp 71 and 72, Appendix p. 13.

In 1956, the number of mills was 101 in this State.(1)  
The table below gives the amount of various oilseeds crushed,  
oil and oilcakes produced in power driven mills in 1954-55  
in Madhya Pradesh.(2)

Table No. 65 showing the amount of oilseeds crushed,  
oil and oilcakes produced in the mills of M.P. in 1954-55.

(Figures in tons)

	<u>Ground-</u> <u>nut</u>	<u>Rape</u> <u>and</u> <u>Mustard</u>	<u>Sesamum</u>	<u>Linseed</u>	<u>Castor</u>	<u>Cotton-</u> <u>Seed</u>	<u>Others</u>	<u>Total</u>
Oilseeds								
crushed	68,680	3,161	9,312	63,135	26	15,811	8,548	168,673
Oil								
Produced	27,376	1,141	3,928	21,397	9	2,009	2,654	58,514
Oilcakes								
Produced	34,563	1,842	4,836	38,587	16	12,759	5,478	98,081

It is to be noted that oil produced in these mills is only  
34.7 per cent of the weight of oilseeds crushed whereas the  
All-India figure is 42 to 45 per cent. Inferior type of seeds  
and obsolete machinery are the contributory factors for this  
low percentage. In connection with linseed oil, the Report  
on Marketing of Agricultural Commodities says that "Extraction

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- (1) Programme of Industrial Development 1956-61, Delhi 1956,  
p. 405.
  - (2) The Eighth Annual Report of the Indian Central Oilseeds  
Committee for the year ending 31st March 1955, Hyderabad  
(Deccan), 1955, pp 186, 188 and 190.

of oil in hydraulic presses and expellers varies from 33 to 40 per cent depending on the quality of seed and the type of machine in which it is crushed."(1)

B. Village Ghanis. (Fig.77). In India it is estimated that about a fourth of the groundnut, about half the rape and mustard, about a third of the linseed, and about 75 per cent of Sesamum are crushed by village ghanis.(2) But "village ghanis have little to choose in respect of seeds which they crush as the seeds grown locally invariably form the only source of their supply... The power mills generally blend more than one type of seed in order to adjust the yield of oil and its pungency."(3)

The Report on Marketing of Agricultural Commodities says that "It is difficult to estimate the exact number of indigenous ghanis in the province. In the year 1934, the estimated number was about 18,500." (4) The Provincial Industries Committee of 1945 gave the estimated number as 17,500.(5) Whatever the number may be, village ghanis have

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- (1) Report on Marketing of Agricultural Commodities, No.2 Linseed, Nagpur 1949, p.17.
  - (2) Report of the Panel on oils and soaps Industries, No. Imprint n.d., pp.3, 6 and 8.
  - (3) Report on the Marketing of Rapeseed and Mustard in India, Calcutta 1950, p.14.
  - (4) Report on Marketing of Agricultural Commodities, no.2. Linseed, op.cit., p.16.
  - (5) Report of the Provincial Industries Committee, 1945, op.cit., p.44.

suffered by mills. The State reported to the Rural and Cottage Sub-Committee of the National Planning Committee that "In the smaller villages there are no ghanis at work and in the bigger villages their number has been reduced to about one-fourth during the last twenty years."(1)

"It is difficult to estimate precisely" says the Planning Commission, "the present rated capacity of the entire oil milling industry comprising the large-scale mills and the village ghanis."(2) According to the estimate of the Central Ministry of Food and Agriculture the village ghanis are responsible for about 29 per cent of the total Indian production of the major oils.

The village ghanis are less efficient as compared to power mills but in the rural economy of the country they have their own especial importance. They are means to supplement the income of cultivators. The ghani oil cake contains 5% more oil than mill oilcakes and in this way it is a wastage of oil.(3) It will be seen from the table given below that

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- (1) Rural and Cottage Industries, Bombay 1948, p. 68.
  - (2) Programme of Industrial Development 1951-56, op. cit., p. 262.
  - (3) Report of the Panel on oils and soaps Industries, op. cit., p. 5.



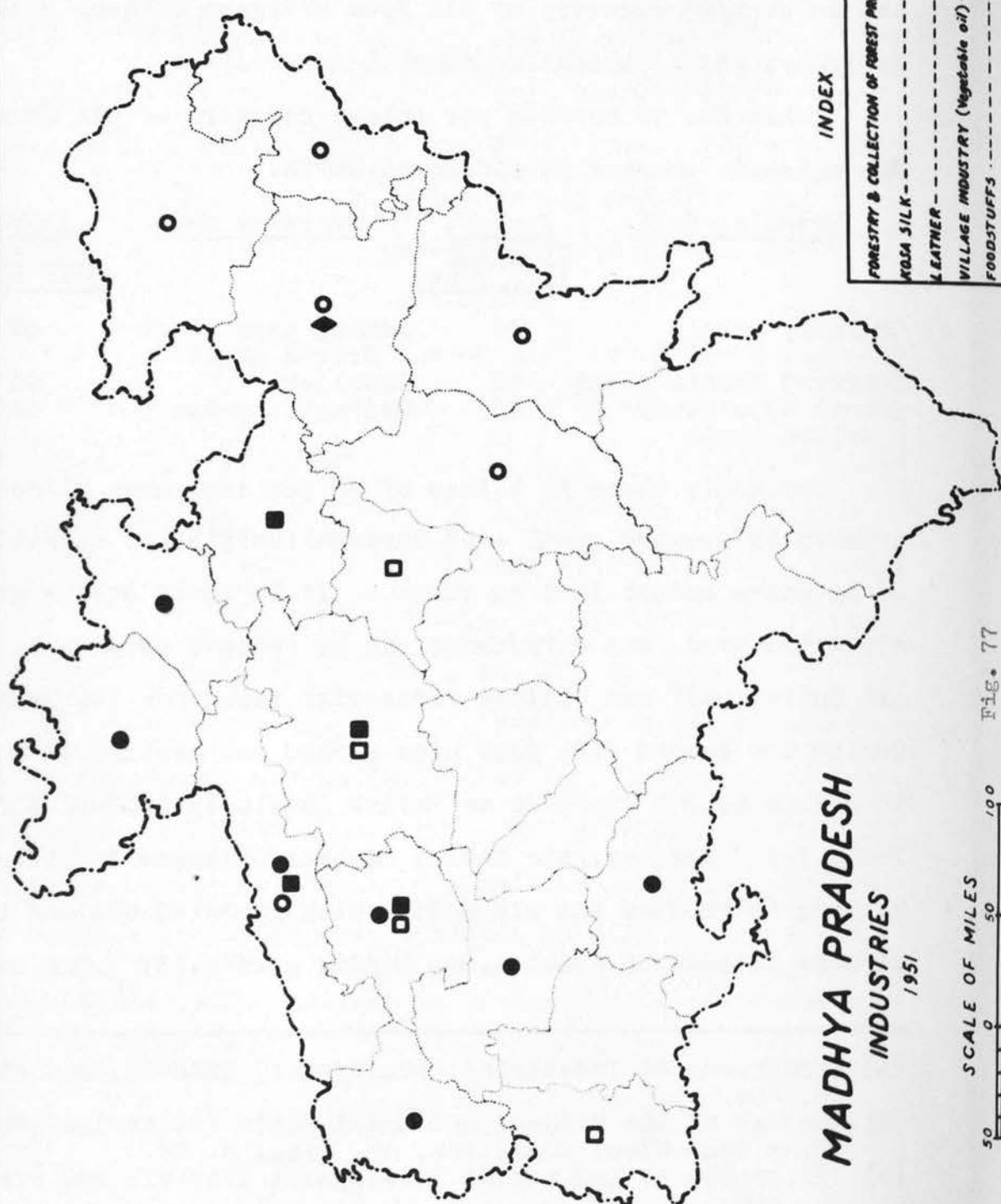
the percentage recovery of oil from ordinary village ghani is lowest and by hydraulic press highest.(1)

Table No. 66 showing percentage recovery of oil from the oilseeds crushed by different units.

<u>Pressing Unit</u>	<u>Approx. recovery (per cent)</u>	<u>Pressing Unit</u>	<u>Approx. recovery (per cent)</u>
Ordinary ghani	35	Bombay type power driven ghani	42
Improved Wardha ghani	40	Expellers	45
Bengal type power driven ghani	42	Hydraulic press	44 to 45

Obviously there is a loss of 10 per cent when oilseed is crushed by country ghani - 5% through inefficient operation and 5% by extra amount left in cakes. If improved Wardha ghanis are introduced, the difference can be reduced very much. The All India Khadi and Village Industries Board for its programme during the second five year plan period has decided to introduce 50,000 improved or Wardha ghanis by 1956-61 throughout India.(2) Besides, the Indian Central Oilseeds Committee is helping to replace the old models with improved one and has already introduced about 4,000 Wardha ghanis.(3) The extra

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- (1) Programme of Industrial Development, 1956-61, op. cit., p. 406.  
 (2) Report of the Village and Small Scale Industries (Second Five Year Plan) Committee, op. cit., p. 50.  
 (3) Programme of Industrial Development 1956-61, op. cit., p. 407.



# **MADHYA PRADESH** INDUSTRIES 1951

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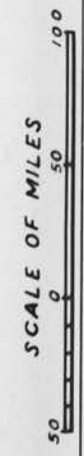


Fig. 77

oil left in the cake can be recovered by a solvent extraction method. The question as to whether "the higher oil content of the cakes obtained from ghanis represents a wast of oil is still a disputed point."(1) On this point research is being conducted by Indian Veterinary Institute, Izatnagar (Uttar Pradesh). Even if it is proved that this higher content of oil is necessary for cattle feed, it is worth to introduce solvent extraction plant as all cakes are not utilized as cattle feed. The major quantity is used for manuring. Another way to solve the problem is to introduce power-driven equipment. The Village and Small Scale Industries Committee advises that experiments be made "for the introduction of power-driven equipment as a part of the process which is already going on, subject, however, to two provisions, viz, that such equipment can be operated by self employed individuals on a decentralised basis and that its introduction does not cause unemployment."(2)

The Government of India set up the Oilseed Crushing Industry Inquiry Committee in 1956. In pursuance of its

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(1) Report of the Village and Small Scale Industries (Second Five Year Plan) Committee, op. cit., p. 50.

(2) Ibid., p. 51.

recommendation "the Government of India have decided to continue the Subsidy of Rs. 150 (£11.5sh.) for each new ghani replacing the older model."(1)

In March 1953, the Government sanctioned the opening of four centres (Amravati, Bastar, Hoshangabad and Raipur) in this State to take up the development of Village oil crushing industry.(2)

In the diet of the majority of the Indian people, vegetable oil is an important source of fat supply. According to the Central Ministry of Food and Agriculture "the per capita consumption of the main vegetable oils in India (direct and indirect) during 1953-54, amounted to nearly 8.6 3lbs per annum, ..." (3). If in this is included "the consumption of ghee (clarified butter) and butter, the per capita availability of fats and oils during 1953-54 was about 11.56lbs. per annum as against the minimum nutritional requirements of 39.2lbs. per annum of fats and oils."(4) According to the Planning

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- (1) Indian Trade Journal, Vol. 201, No. 6 August 10, 1957, Calcutta, p. 291.
  - (2) The Eighth Annual Report of the Indian Central Oilseeds Committee, op. cit., p. 103.
  - (3) Oilseeds in India 1953-54, Delhi 1956, p. III
  - (4) Ibid., p. III.

Commission there is "a per capita consumption of 8.2lbs. (6.7lbs. of edible oils and 1.5lbs. of Vanaspati.)"(1) This does not take into account the consumption of butter and ghee. The Panel on oils and soaps Industries is of the opinion that for edible purposes the per capita consumption of fats in India is 0.35oz. per day while the Nutrition Advisory Committee recommends 2oz. per day as minimum.(2) In Madhya Pradesh the per capita consumption of edible oils and ghee comes to 0.38oz. per day.(3) All the figures given above are speculative. The data of production of all oil, vanaspati, ghee and butter are not available. Data are available, if at all, for oil and vanaspati produced by mills, and a small quantity of ghee which passes through the Agricultural Marketing Board. Even for these data the Report on the Marketing of ~~Rapeseed~~ and Mustard says that "statistics about the quantities crushed by the mills are completely lacking. The position in respect of the quantities handled

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- (1) Programme of Industrial Development 1956-61, op. cit., p. 412.
  - (2) Report on the Panel on oils and soaps Industries, op. cit., p. 1.
  - (3) Report on Marketing of Agricultural Commodities No. 3 Groundnut, Nagpur 1950, p. 45.

(1) Report on the  
op. cit., p. 34

(2) Programme of  
p. 406.

by Village ghanis, if anything, worse. These small units are scattered in villages all over the country and are invariably operated by illiterate persons, who not only keep no records but are seldom able to give even estimates of the quantities crushed by them."(1) The Planning Commission also admits that "There are no data available to indicate the relative shares of large scale mills and ghanis in the total output of vegetable oils and the actual progress made by the latter ..."(2). Over and above this only a small quantity of oil produced by ghani goes to the market. But a much greater quantity of oil crushed in village ghanis is sold by individual crushers to individual customers and for which there is no account. Most of the milk products (ghee, butter, milk and curd) are supplied by individual milkman to his customers. A good many men in villages purchase oilseeds and get them crushed in ghanis for their domestic consumption. Every person who can afford, even under a little economic pressure, especially in villages (and the over-whelming majority lives in villages) keeps a cow or she-buffalo for domestic requirements of milk and its products. From the

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- (1) Report on the Marketing of Rapeseed and Mustard in India, op. cit., p. 12.  
 (2) Programme of Industrial Development 1956-61, op. cit., p. 406.

7. by introducing

plants,

8. by utilizing



above it will be seen that there are various sources of supply of oils and fats for which it is impossible to get any data. But still it can be safely presumed that the per capita consumption of oils and fats in India is less than the nutrition requirements. Besides home demand, India must produce some for export as it is a good foreign currency earner.

To meet internal as well as external demand of oil, the production of oil should be increased. The production can be increased by the following methods:-

1. by increasing the acreage under oilseeds wherever possible without prejudicing the foodgrains production.

As far as this State is concerned, the suggestion for expansion of oilseeds acreage has been given when dealing with oilseeds production under agriculture.

2. by introducing better seeds giving greater percentage of oil;

3. by adopting methods to increase yield per acre;

4. by introducing improved types of ghanis;

5. by introducing more efficient machineries in mills;

6. by introducing more modern and efficient techniques of crushing;

7. by introducing a greater number of solvent extraction plants,

8. by utilising greater amounts of cotton seed; and

9. by exploiting other oil-bearing crops which are more or less neglected at present.

The vegetable oil is required mainly for culinary purposes in India, a small amount for illumination on the occasion of religion festivals, as essential raw material for important industries such as soaps, toileties and glycerine, paints and varnishes, lubricants and vegetable ghee industry.

Groundnut and rape and mustard oils are mainly used for edible purposes. Linseed oil is mainly of industrial importance in the manufacture of paints and varnishes, boiled oil, printing inks, oil cloth, waterproof fabrics, soft soaps, and tanning industry. In some parts of India, as in M.P., it is also used as edible oil. Sesamum oil is used chiefly as an edible oil and to a certain extent for toilet purposes, especially as dressing for the hair. Castor oil is mainly used for medicinal purposes, and is also used widely as a lubricant. Other purposes for which castor oil is used are the manufacture of soaps by the cold process, for soft soaps, Turkey-red oil, and for toilet purposes. Dehydrated castor oil is used in the manufacture of paints and varnishes.

Groundnut, castor, linseed, and rape and mustard oils are mainly exported. Groundnut oil is mainly exported to the United Kingdom, Netherlands, Belgium, Italy and Burma; castor oil to the U.S.A., U.K. and Australia; linseed oil to the U.K., Netherlands and Australia; and rape and mustard to the U.K. (1)

The more important programme for vegetable oil industry in the first five year plan was the formulation of a common production programme for mills and ghanis; an increase in efficiency of ghani extraction by 2%; an agreement for mills to produce 760 thousand tons of oil and ghanis 510 thousand tons by 1955-56 the expansion of the cotton seed industry; the introduction of solvent extraction plants; the creation of additional demand of 100,000 tons for soap, paints and varnishes and other industries; the exploitation of oil-bearing crops at present neglected; and a target of 170,000 tons for export.(2)

The Village and Small Scale Industries (second five year plan) Committee made certain suggestions to safeguard the interest of village oil industry during the second plan period. The more important recommendations are

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- (1) Programme of Industrial Development 1956-61, op. cit. p. 409.  
 (2) Ibid, p.405.

the reservation of certain oilseeds, viz. sesamum, rape and mustard exclusively for ghanis, the diversion of greater quantity of groundnut to ghani and the allocation of all cotton seed to the mill industry. (1)

According to the Planning Commission "for a total population of 40 crores (400 million) by 1960-61, the total requirements of vegetable oils and vanaspati would come to about 1,572,000 tons".(2)

2. Cotton Seed Oil. This is an excellent edible oil which is more or less neglected in India. The amount crushed in India is only about 15 per cent of the total crop(3). In 1953-54 the production of cotton seed in Madhya Pradesh was 226 thousand tons.(4) In the same year cotton seed crushed in the State was 14,531 tons - only 6.4 per cent of the total cotton seed produced.(5)

The problem of delinting and dehusking is creating a difficulty in its large scale utilisation. The result is that almost all cotton seed is used as cattle feed for milk cattle. Owing to its demand as cattle feed "its price is invariably and fictitiously high for the

- 1) Report of Village and Small Scale Industries (Second Five year Plan) Committee, op.cit., p.49.
- 2) Programme of Industrial Development 1956-61, op.cit. p.412.
- 3) Report of the Panel on oils and soaps industries op.cit. p.12.
- 4) Estimates of Area and Production of Principal crops in India 1953-54, Delhi 1956, p.40.
- 5) The Eighth Annual Report of the Indian Central Oilseeds Committee, op.cit., p.186.

oil miller and has not attracted his attention, as he has found that his cost of oil would be higher than the price of other edible oils." (1)

It is not only that oil from dehusked and delinted seed is generally cleaner than that of undecorticated seeds, but also "the yield of oil, by crushing cotton seeds in their natural state, would be 10 to 12% whereas if the seeds were delinted and dehusked, the yield could be improved to as much as 14 to 16%" (2). Delinting of cotton seed involves a special process and for different varieties of cotton seed different types of machine are required. The Government of India should take up the experiment and designing of deluters to suit Indian types. At present, the major part of cotton seed is crushed without decortication while only a small part is done by special modern machinery which combines delinting and dehusking operation before the seeds are crushed.

Linter is an important by-product. The present use of linters in India is in waste spinning and to a limited extent in the manufacture of artificial silk. Another important by-product is husk which is used as cattle feed or as fuel in some areas. In other countries, it is used

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(1) Report of the Panel on oils and soaps industries  
op. cit. p.13.

(2) Ibid, p.13.

in the manufacture of cellulose, blotting paper, gun cotton, rayon, surgical lint and textile goods like soft towels. In India, these industries are on the way to being developed and the demand for linters should increase progressively. It is estimated "that on an average about 2% of linters can be obtained from cotton seed." (1)

The oil produced can be utilised in vegetable ghee industry. If refined, it is a good cooking oil. Its cake is an excellent cattle feed.

On the coming into force of the Industries (Development and Regulation) Act 1954, the Government granted licences to set up 4 vegetable oil mills in M.P. on the condition that they would crush only cotton seed. (2) These are to be equipped with delinting and hulling machines. The location of firms and the annual capacity are shown below

<u>Location.</u>	<u>Annual Capacity in terms of cotton seed (tons).</u>
Badnera (District Amravati)	7,200.
Khandwa ( " Nimar )	30,000.
Khamgaon( " Buldana )	2,800.
Akola	9,000.

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- (1) Report of the Panel on oils and soaps industries, op. cit., p.13  
 (2) Programme of Industrial Development 1956-61, op. cit., p.407



### 3. Vanaspathi (Hydrogenated oil). (Fig. 76). It

These vegetable oil mills are located in the main cotton-growing districts of the State, and near to 325 of its cotton ginning and pressing factories. From the transportation point of view, too, they are favourably situated. Three of them, Badnera, Akola and Khandwa are on the main double lines of the Central Railway, directly connecting them with Bombay and Calcutta. The fourth, Khamgaon, is only 5 miles away from the main Central Railway but is connected with it by a railway line. Thus all the four are directly connected with Bombay and Calcutta. Khamgaon is 341 miles from Bombay, Khandwa 353 miles, Akola 363 miles, and Badnera 413 miles. Through Nagpur, they are connected with the main line of Delhi-Madras. Thus they are well served with rail in all direction and with the two most important parts of India. These places are also well served with roads for internal transport.

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- (1) *Journal of Industry and Trade*, Vol. VI No. 12, December 1956, New Delhi, p. 1853.
  - (2) *Large Industrial Establishments in India 1950 and 1951*, op. cit., p. 84.
  - (3) *Programme of Industrial Development 1955-61*, op. cit., p. 416.

3. Vanaspati (Hydrogenated oil). (Fig. 76). It was in 1930 that the first factory was set up in India to produce Vanaspati. It had a production of only 298 tons. In 1946 the All-India capacity was 192,000 tons with an annual production of 135,000 tons while in 1956 the capacity increased to 412,000 tons and annual production to 300,000 tons.(1)

Two factories in Madhya Pradesh came into production for the first time in 1951 - one at Akola and the other at Shegaon (District Buldana).(2) In 1951, the average number of workers employed daily was 548.

In April 1951, at the commencement of the first plan period there were 48 factories in India having a rated capacity of 333,228 tons. Out of these, 2 with annual rated capacity of 19,500 tons were located in this State. The Planning Commission estimated that by 1955-56, the demand for Vanaspati would be 300,000 tons per annum. Consequently it recommended not to increase the capacity any further during the first plan period.(3)

- (1) Journal of Industry and Trade, Vol. VI No. 12, December 1956, New Delhi, p. 1853.
- (2) Large Industrial Establishments in India 1950 and 1951, op. cit., p. 84.
- (3) Programme of Industrial Development 1956-61, op. cit., p. 416.

For various special reasons the capacity of certain factories was sanctioned to be increased. Thus the All India capacity increased to 445,000 tons and of M.P. to 21,300 tons by 1955-56. In the second plan period the estimated consumption of Vanaspati would be about 380,000 tons by 1960-61 and the Planning Commission is of the opinion that the rated capacity of 445,000 tons would be sufficient to meet the requirements during the second plan period.(1) The target of production under the second plan is 400,000 tons in 1960-61.(2)

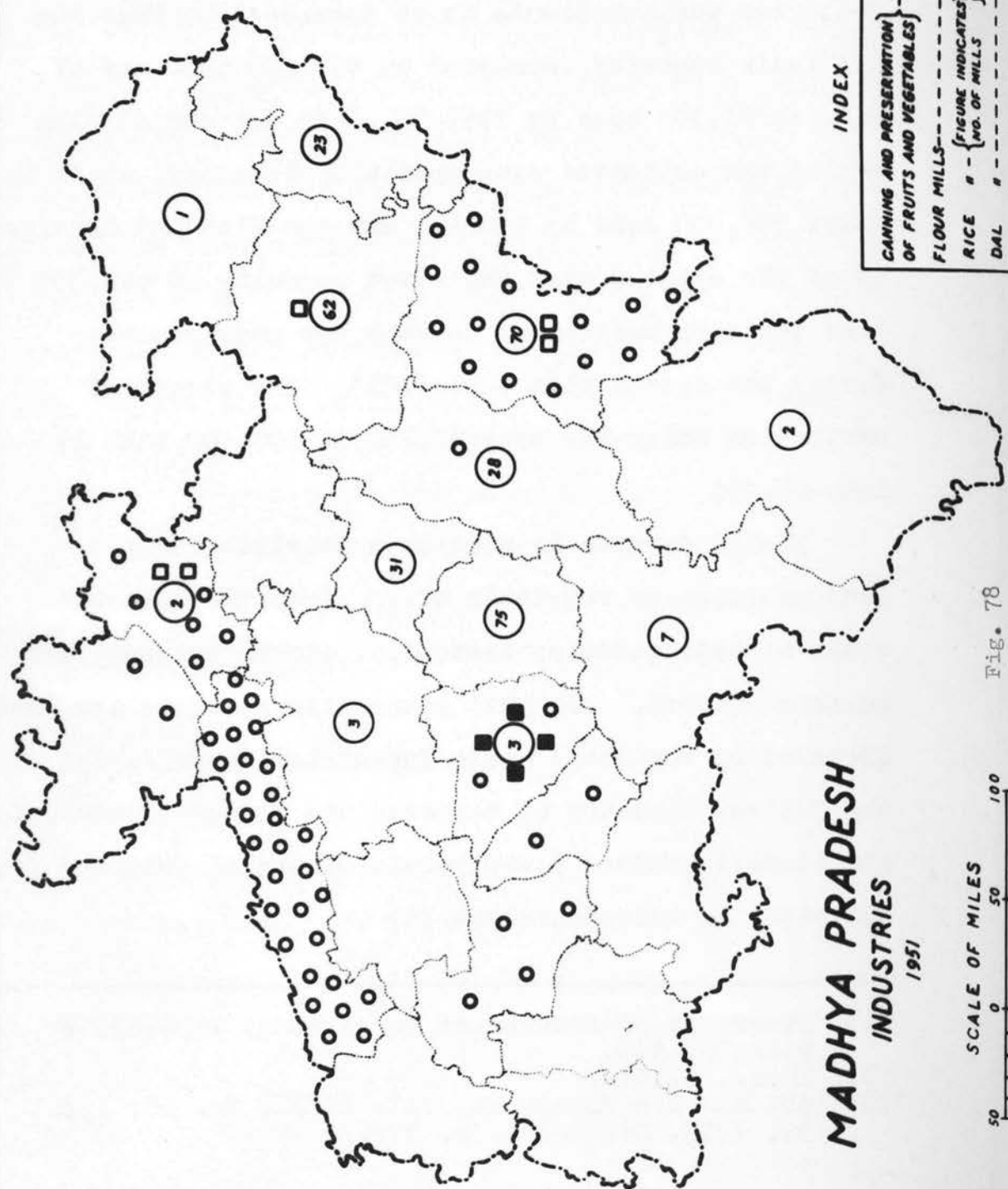
Nickel formate is used as a catalyst for the hydrogenation of vegetable oil. From the catalyst waste of hydrogenation factories, nickel sulphate can be manufactured. In this connection a scheme has been prepared by the Small Scale Industries Organisation of the Central Ministry of Commerce and Consumer Industries and it will produce 5,000 pounds of nickel sulphate from 100 cwts. of waste catalyst.(3)

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(1) Programme of Industrial Development 1956-61, op. cit., p. 419.

(2) Ibid., p. 419.

(3) The Eastern Economist, Vol. XXVIII No. 16, April 19, 1957, New Delhi, p. 599.



The main raw materials required for Vanaspati industry are groundnut oil or cotton seed oil, coal, electricity, water and tin. There is much scope for its development in the cotton-growing and groundnut tract of Berar, Nagpur and Wardha. Hydrogen for the industry can be obtained by electrolysis of water, as is done in most of the factories in India. Hydrogen can also be obtained as a by-product from a caustic soda plant, if it is located nearby. A factory can be located in the Chanda district where a caustic soda plant has been suggested. Electricity can be obtained from the projects completed or under contemplation. Tin can be obtained from Tatanagar which is not far off from these places.

#### 4. Fruits and Vegetable preservation. (Fig. 78).

Besides the well-known Nagpur oranges, Chhindwara produces large quantity of potatoes, and in other parts of the State, other fruits like guaves and mangoes, and various vegetable are grown. The total arrival of Nagpur oranges in every season is about 45,000 tons, while in Adarbaizan and Georgia, the total production during the whole season of 3 months is about 15,000 tons.(1)

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(1) The Hitavada, January 31, 1957. Nagpur, p. 2.  
(Daily paper).

The estimated production, export and the market arrivals in Nagpur of oranges for the quinquennium ending 1949-50 are given in the table below.(1)

Table No. 67 showing production and marketing of oranges in M.P.

<u>Year</u>	<u>Estimated Production of oranges (Tons)</u>	<u>Estimated Exports (Tons)</u>	<u>Arrivals in the Nagpur Market (Carts)</u>
1945-46	116,867	96,000	109,314
1946-47	109,787	86,000	91,178
1947-48	99,405	80,000	100,560
1948-49	106,880	86,000	96,776
1949-50	22,524	18,000	21,682

However, "nearly 40 per cent is wasted because cultivation is unscientific, picking and transport to the markets are primitive, grading is almost absent and methods of packing are injurious to the fruit. But more than all these, thousands of tons of oranges rot or are sold at uneconomical prices because there are no facilities for their preservation."(2)

The present position of the industry in India is that there is a very large number of small and decentralised units in different parts of India. The main

- 
- (1) Census of India, 1951, Vol. VII, Part I-A, op. cit., p. 87.  
 (2) Ibid., p. 195.



concentration of the industry is in Nagpur, Bombay, Delhi, Amratsar and U.P. Of the estimated production of 11,542 tons by large units in India in 1954, M.P. produced 460 tons.(1) But the Planning Commission is of the opinion "that the production figures furnished by the factories are generally underestimates. The systems of levying a licensing fee based on annual turnover has resulted in factories reporting their production as lower than what it actually is."(2)

It was only in 1949 that the first concern at Nagpur started regular production. Its storage capacity is 1,400 tons and "is carrying on bottling of orange juice, canning of peas, oranges and other vegetable, cold storage of potatoes, etc. ..." (3) There are two other companies at Chhindwara who have specialized in cold storage only. From one factory in 1949, the number increased to 4 by 1951. All are located in Nagpur and

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(1) Programme of Industrial Development, 1956-61, op. cit., p. 429.

(2) Ibid., p. 429.

(3) Census of India, 1951, Vol. VII, Part I-A, op. cit., p. 357.

(2) Programme of Industrial Development, 1956-61, op. cit., p. 431.

the average number of workers employed daily in 1951 was 349. (1) It will be seen that the industry is concentrated in Nagpur. The main reason is that the famous Nagpur oranges are grown in and around Nagpur. Nagpur being connected with railways and net of roads, it is the main market of these oranges. There are vegetable gardens around Nagpur suburb to supply to the biggest town of the State. Nagpur, being most industrially developed and capital of the State, is better off economically. Hence, there is a greater demand for canned goods. Since these articles get ready market and can get imported preservatives directly, these concerns have been established there.

The important raw materials required for this industry are fruits and vegetables, sugar, salt, tins and bottles. These raw materials are available in the country "but the prices at which they are available to the industry in India are in many cases appreciably higher than those prevailing in certain countries."(2)

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- (1) Large Industrial Establishments 1950 and 1951, op. cit., p. 26.  
 (2) Programme of Industrial Development, 1956-61, op. cit., p. 431.

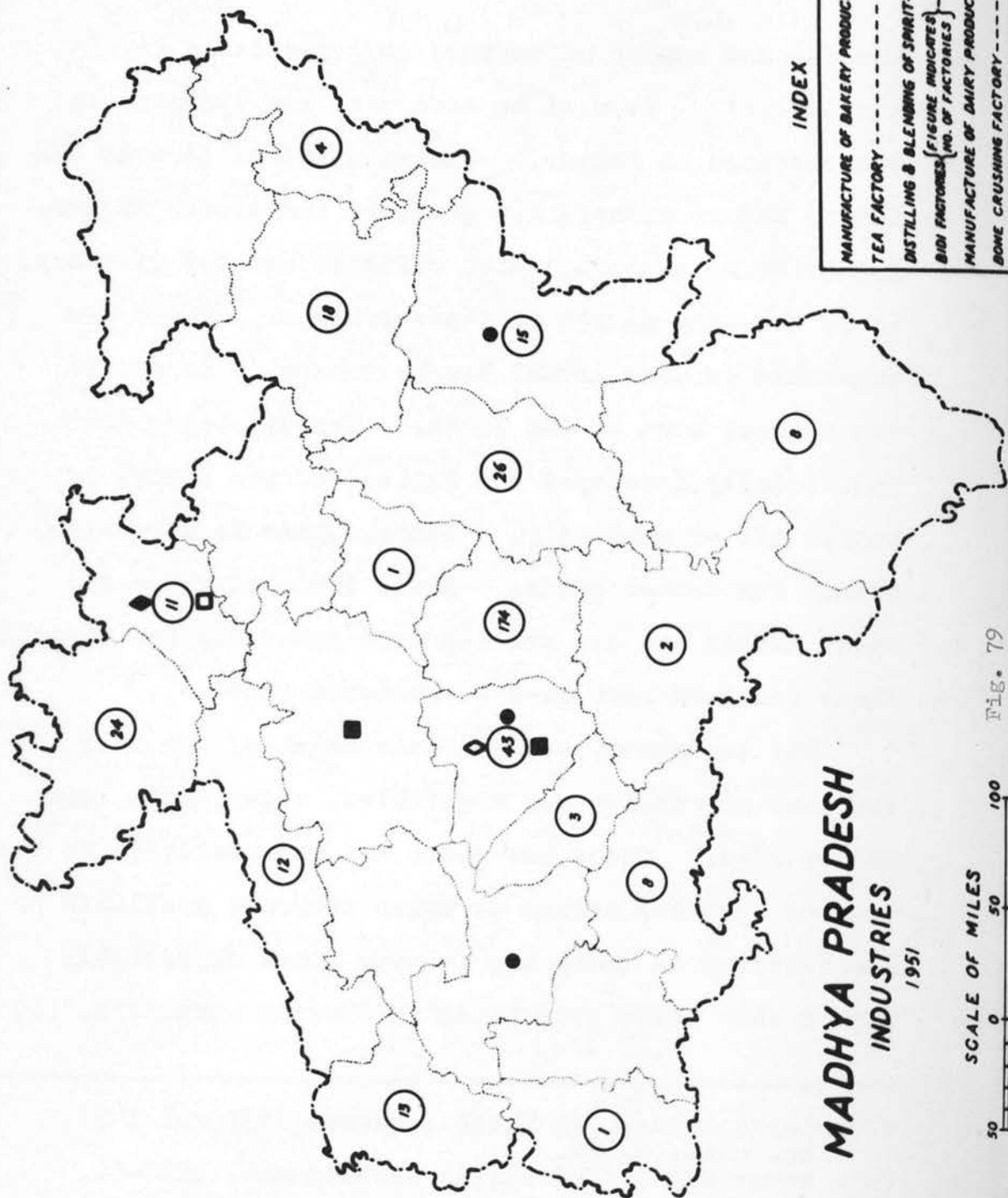


Fig. 79

In most countries, tea and sugar are supplied by the government at concessional rate, it not for internal demand, at least for export market. Hence, the Indian industry cannot compete unless the Government gives this concession.

There is much scope for the development of this industry in this State, if the centre supplies sugar and tin plates at concessional rates by remitting taxes on them.

5. Biscuits and Confectionary. (Fig. 79) Of the 39 organised units of biscuit factories, none is located in this State.(1) Though M.P. is not a major wheat-growing region of India, it grows generally a sufficient amount to provide a little which is exported to other States. The absence of any biscuit factory can be attributed to the absence of demand. Economically M.P. is most backward, there is no great demand and people have no substitute for biscuits. The important raw materials for biscuit making are wheat flour, sugar and fat. Other materials in small quantities required are milk solids, glucose, honey, flavours, malt, antioxidants, etc.

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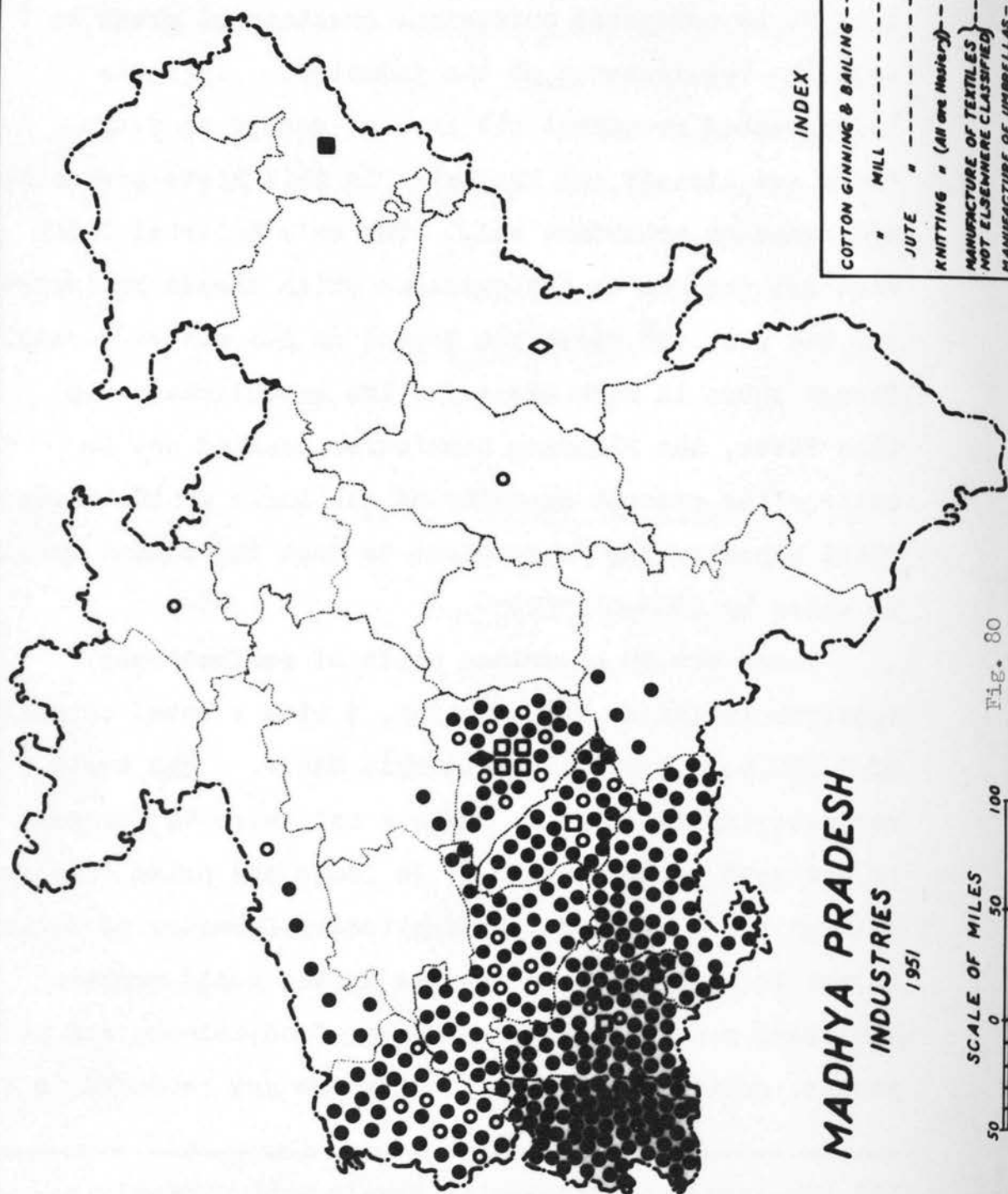
(1) Programme of Industrial Development 1956-61, op. cit., p. 421.

This State possesses sufficient quantity of wheat to meet the requirements of the industry. In India hydrogenated groundnut oil is used mostly as fat. There are already two factories in this State producing hydrogenated groundnut oil. The only material India does not produce is antioxidants which should be imported. For the rest the State can depend on its own resources. Though there is much scope for its establishment in this State, the Planning Commission decided not to enlarge the present capacity of All India as the present rated capacity was "sufficient to meet the demand likely to arise by 1960-61."(1)

There are 40 organised units of confectionery concerns in India, out of which, 3 with a rated capacity of 3,692 tons are located in this State. The basic raw material is sugar. Sugar constitutes 40 per cent of the cost of production. In India the price of sugar is high and as such the confectionery industry of India is not in a position to compete in the world market. The other raw materials, essences, food colours and milk powder, suitable for the industry are not produced in

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(1) Programme of Industrial Development 1956-61, op. cit., p. 423.



INDEX

- COTTON GINNING & BAILING
- " MILL
- JUTE
- KNITTING " (All are Masieri)
- ◆ MANUFACTURE OF TEXTILES  
NOT ELSEWHERE CLASSIFIED
- ◇ MANUFACTURE OF UMBRELLAS

# MADHYA PRADESH INDUSTRIES 1951

SCALE OF MILES  
50 0 50 100

Fig. 80



India and are, therefore, imported. Unless India starts producing the quality materials, there is no use expanding this industry. Under the second five year plan no further expansion has been envisaged as "the existing capacity is lying idle it does not seem necessary to expand capacity further for meeting the probable demand in 1960-61." (1)

## II. Industries based on other agricultural raw materials.

1. Cotton Textile Industries.(Fig. 80) It is one of the very important industries of the State, both from the point of view of capital investment and employment. Cloth is produced in Madhya Pradesh as in other parts of India by mills, handlooms and powerlooms. There is conflict of interest among the industrial sectors. Each wants to eliminate the other. The textile Enquiry Committee invited the opinions of various interested parties on the allocation of the fields of production among these sectors. There is not only wide divergence in the opinions expressed by different sectors but also there is difference expressed by different bodies of the same sector and also by different State Governments.(1) As far as this State is concerned it recommended certain types of cloth for handloom, another type for powerlooms and sought to debar the mills from manufacturing

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(1) Report of the Textile Enquiry Committee, Vol. III, Delhi 1955, p.1368

these types. Further, the mills were expected to receive certain proportion of the capacity for export.(1) Under the first five year plan "the principle of a common production programme for large-scale and small-scale industries" was accepted.(2)

A. Cotton Textile Mills. It was in 1877 that the first cotton mill in this State (Nagpur) came into operation through the enterprise of J.R.D. Tata. By 1904, the number increased to 8 (Nagpur 2, Wardha 3, Jabalpur, Durg and Amravati one each) with 193,020 spindles and 2,649 looms. (3) According to the C.P. Directory, the number was 12 in 1909 and rose to 14 in 1925.(4) According to the Indian Textile Industry-

Table No. 83 showing the installed capacity of the Cotton Mills in M.P. as on 1st April, 1951 and on 1st January 1956.

No. of Companies Mills  
Spindles

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- (1) Report of the Textile Enquire Committee, Vol. III, Delhi 1955, pp. 1381-1382.
  - (2) Report of the Village and Small Scale Industries (Second Five Year Plan) Committee, Delhi 1956, p.6.
  - (3) C.P. Gazetteer 1908, op.cit., p.61 and Berar Gazetteer 1909 op.cit., p.36.
  - (4) The Commercial and General Directory of Central Provinces and Berar, 1938, Khandwa (District Nimar), n.d., p.359.

1956, p. 359.

Annual 1955-56, there are 11 mills (Wardha 3, Amravati, Akola and Nagpur 2 each, Durg and Nimar 1 each) with 373,869 spindles and 7,350 looms and the average number of hands employed daily as 17,610.(1) The Large Industrial Establishments in India, a Government of India publication, mentions 27 mills in this State, with the average daily employed as 29,130.(2) Out of these 27, Nagpur and Nimar have 7 each, Amravati 5, Wardha 3, Akola 2, Durg, Hoshangabad and Jabalpur 1 each. The situation is better than 1951 when the

The installed capacity of the cotton textile industry in this State as on the 1st April, 1951 and the 1st January, 1956, is given in the table below.(3)

Table No. 68 showing the installed capacity of the Cotton Mills in M.P. on the 1st April, 1951 and the 1st January 1956.

	<u>1951</u>	<u>1956</u>
No. of Composite Mills	11	11
Spindleage	366,555	374,130
Loomage	7,218	7,394

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- (1) The Indian Cotton Textile Industry, 1955-56, Annual, Vol. XVIII, Bombay, pp XX and XXII  
 (2) Large Industrial Establishments in India 1950 and 1951, Delhi 1956, p. 165.  
 (3) Programme of Industrial Development 1956-61, Delhi 1956, p. 339.

The total cotton textile produced by mills in this State in 1954, was 126,100,000 yards.(1) If the same average is maintained the annual production at the end of 1957 would be 450,156,000 yards. With the present mean decimal growth-rate of 7.9 per cent, the population of the State at the end of 1957 would be about 22.5 million. Thus available per capita consumption of cloth would be about 20 yards. This does not account for the production available from powerlooms and handlooms. The situation is better from 1951 when the State had to import "a sizeable portion of its requirements of cotton textiles and yarn from the neighbouring State."(2) This may be greater than the All India target of 18.5 yards per head at the end of the second plan period (1960-61), but the off-take of cotton cloth is less than in many countries - U.S.A. 64 yards, U.K. 35 yards, Japan 22 yards and Egypt 19 yards.(3) The

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- (1) Indian Textile Industry (Cotton, Woollen and Rayon), Statistical Bulletin, Vol. 3 No. 6, June, 1957, Bombay 1957, p. 35.  
 (2) Census of India, 1951, Vol. VII Madhya Pradesh, Part IA - Report, Nagpur 1953, p. 355.  
 (3) Somani, G.D. - Textile Industry Under Second Five Year Plan - Textile India 1956, Calcutta 1957, p. A72.

Indian consumption of cloth per capita since 1927-28 is given below.

During 1927-28	Between 15 and 16 yards
Until 1947-48	" 12 and 14 yards
1950-51	8.9 yards
1951-52	12.3 yards
1955-56 (End of First Plan)	15 yards
1960-61 (End of Second Plan)	18.5 yards

It will be seen that India has not yet reached the pre-war level of 16 yards.

The population of this State at the end of the Second plan (1960-61), would be about 23 million according to the present mean decimal growth-rate of 7.9 per cent. The total demand of cloth at that time would be about 69 million yards if the target of 30 yards per person per annum is to be achieved as recommended by the Provincial Industries Committee, of 1945. Besides, local consumption, the State mills are favourably located in cotton zone to cater to the demand of other States which are deficient in cotton production. Over and above this, the State should also supply exports to foreign countries to earn foreign exchange. There should be large scope for the expansion of mill industry

in this State without jeopardising the interest of handlooms and powerlooms. The best location would be in Wun (District Yeotmal), Chanda, Pulgaon (District Wardha). Power can be supplied from the central thermal station at Nagpur. Akola and Malkapur (District Buldana) are also worth consideration.

Of the 27 mills, 24 (or 88.9%) are in the cotton zone, 2 (or 7.4%) in the wheat zone and 1 (or 3.7%) in the rice. The distribution is conspicuous by the absence of mill in the Yeotmal and Buldana of cotton zone and by the presence in Hoshangabad, Jabalpur of the wheat zone and Durg of the rice zone. There is large acreage under cotton in Yeotmal and Buldana, Yeotmal 574,324 acres and Buldana 480,598 and Sheogaon and Khamgaon of Buldana and Yeotmal are on the railway line. Of the three districts outside the cotton zone having cotton textile mills, only Hoshangabad has some acreage under cotton (30,667 acres), while neither Jabalpur and Durg nor their neighbouring districts grow any cotton. In relation to transport, the industry is favourably located. The mills of Akola, Amravati, Durg, Nagpur and Wardha are on the main line of Calcutta - Bombay, and of Nimar, Hoshangabad and Jabalpur are on the Bombay - Allahabad line, connecting with Calcutta through Allahabad.



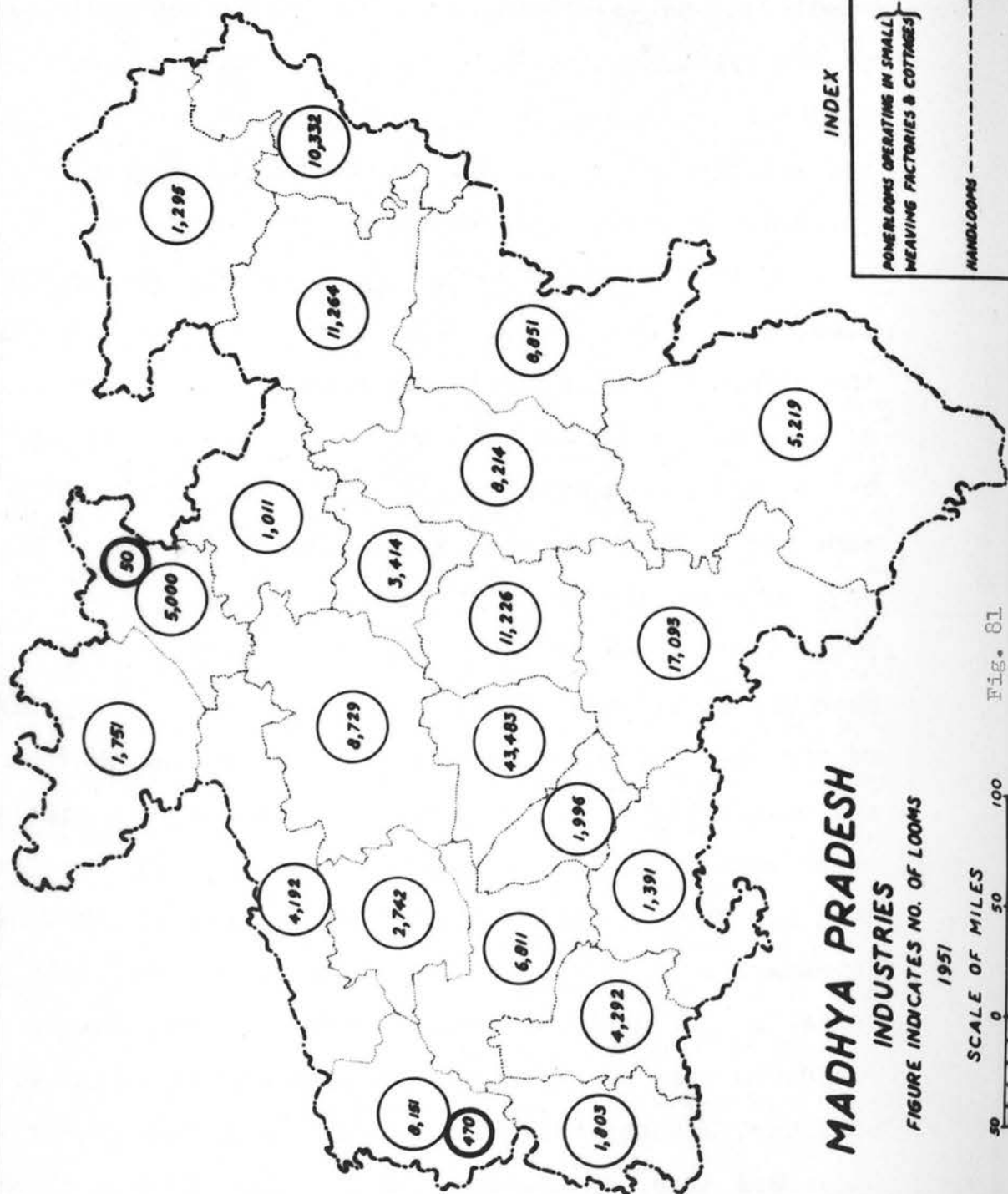
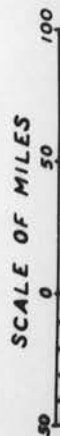


Fig. 81



These mills are also on the railway line, north-south through Nagpur or through Jabalpur. The mills of the cotton zone are located in the Berar and Nagpur Plains and these are the most developed areas from transport point of view, both rail as well as road transport. Thus the mills are favourably located in relation to internal market as well as ports. The mills have generally their own power plants. But after the implementation of electricity projects under contemplation, cheaper electricity would be available to the industry.

B. Handloom (Fig.81). Hand-woven cloth is one of the oldest industries in India, practised from time immemorial. It came to decline with the advent of machine-made cloth, but never ceased altogether. The Foreign Goods Boycott Movement of the All-India Congress "gave a fillip to the handloom industry but it was short-lived (1). During the Second World War, when the foreign goods could not be imported and Indian mills, in spite of big expansion, could not supply civilian demands, since the mills were busy to supply the Army, the handloom industry got an impetus to expand. The Madhya Pradesh Government, among other States, thinks "that handloom industry developed materially during the war years due to shortage of cloth, but now it is

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(1) Provincial Industries Committee Report, 1945, op.cit., p. 39.

declining due to competition from mill cloth which is cheaper, more attractive, and freely available being preferred by consumers"(1). Further it observes that "since the cessation of war, markets are dull and competitive due to larger availability of mill cloth resulting in wide-spread unemployment in Handloom Sector"(2).

In India various types of handlooms are in use. Of them, throw-shuttle looms are about 64%, fly-shuttle 35% and other types 1% (3). In Madhya Pradesh the fly-shuttle looms are 47% of the total loomage (4). It is to be noted that fly-shuttle looms are more efficient and the Government is trying to replace throw-shuttle looms by the fly-shuttle.

It is not possible to have the correct statistics of hand-looms. Even the Government of India admitted "that the figure of 2.8 million looms (for all India) was calculated in 1951 at a time when there was an acute shortage of yarn and the number was inflated in order to secure additional yarn supplies"(5). Still attempt can be made to give a fair idea of the situation. On the 30th June, 1952 there were 168,260 handlooms in this State, dispersed in all the districts as is shown in the table below (6).

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(1) Report of the Textile Enquiry Committee, Vol.III, op.cit., p.1410.

(2) Ibid, p.1410.

(3) Gandhi, M.P. - A.Monograph on Handloom Weaving Industry in India, Bombay 1948, p.57.

(4) Ibid, p.77.

(5) The Indian Cotton Textile Industry, vol.XVIII(1955-56 Annual) op.cit., p.12.

(6) Indian Census, 1951, Vol.VII, M.P. Part IA - Report op.cit. p.39.

Table No.69 showing the number of handlooms in Madhya Pradesh as on the 30th June, 1952.

<u>District</u>	<u>No.of Handlooms</u>	<u>District</u>	<u>No.of Handlooms</u>
1. Akola	4,292	12. Hoshangbad	4,192
2. Amravati	6,811	13. Jabalpur	5,000
3. Balaghat	3,414	14. Mandla	1,011
4. Bastar	5,219	15. Nagpur	43,483
5. Betul	2,742	16. Nimar	8,151
6. Bhandara	11,226	17. Raigarh	10,332
7. Bilaspur	11,264	18. Raipur	8,851
8. Buldana	1,803	19. Sagar	1,751
9. Chanda	17,093	20. Surguja	1,295
10. Chhindwara	8,729	21. Wardha	1,996
11. Durg	8,214	22. Yeotmal	1,391
TOTAL			<u>168,260</u>

It is interesting to note that the agriculture zone having the lowest average percentage of cotton acreage, possesses highest number of handlooms in the State as is shown in the table below.

Table No.70. Showing the average percentage of cotton area, mills, ginning and pressing factories and handlooms in various agricultural zones of the State.

<u>Zone</u>	<u>Average %age of Cotton area</u>	<u>%age of Mills</u>	<u>%age of Ginning &amp; Pressing Factories</u>	<u>%age of handlooms</u>
Cotton	96.3	88.9	96.0	40.3
Wheat	2.0	7.4	2.8	14.0
Rice	<u>1.7</u>	<u>3.7</u>	<u>1.2</u>	<u>45.7</u>
TOTAL	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>

The reasons may be one or the other, or combination of the factors given below.

1. There is least number of cotton mills in this zone.
2. There is least number of ginning and pressing factories.
3. It has a less developed transport system than other zones (most developed is the cotton zone).
4. Economically it is less developed than other zones.
5. The fourteen Indian States that have been amalgamated with this State are in this zone and these States were more backward than the British India.
6. Mostly, the improvement in cotton varieties have been attempted in the cotton zone and the cotton of this zone may not be suitable for mills.

The number of handlooms decreased to 105,000 by 1955 as the boom period expired and the industry could not compete with cheap mill-made cloth.(1)

The handloom produces cloth from mill-made as well as hand-made yarn. In this State, saris, dhotis, uparnas, chaddars, handkerchiefs, pugris, gonas, shintings, coatings, etc. are the chief types of hand-woven cloth piece-goods produced. (2)

The State Government has taken up certain steps to improve the conditions of the handloom industry. It has

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- (1) Report of the Textile Enquiry Committee, Vol.III, op.cit., p.1368.
  - (2) Report of the Fact-Finding Committee (Handloom and Mills), Calcutta 1942, p.123.



been successful to a certain extent in introducing fly-shuttle sleys and improved appliances, like dobbies and jacquards. The other efforts made during the last 20 years by the M.P. Government are the training-cum-production schemes, to help the workers to provide reserved varieties, to create co-operative societies to purchase raw material (1). Another is the effort to replace old handlooms with improved kind, known as Ambar Charkha. The All India Khadi and Village Industries Board thinks that "the implementation of the programme (Ambar Charkha programme) is likely to provide gainful employment to 50 lakhs (5 million) spinners, in the manufacture of Ambar yarn. 8.33 lakh (833,000) weavers and 4.17 lakh (417,000) weavers' assistants will also find employment in the manufacture of cloths. In the manufacture of Ambar Charkha sets, the programme is likely to provide employment to 12,780 carpenters (2).

Unless some specific steps are taken by the Central and State Governments, the handloom industry cannot survive the competition with mills (3). Not only is the cost of production of handloom higher than that of powerloom, but time taken by handloom in manufacturing a sari 50" x 8½ yards is 16 hours

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- (1) Textile Enquiry Committee Report Vol.III, op.cit.,p.1450.
  - (2) The Report of the Ambar-Charkha Enquiry Committee, 1956, Delhi 1956, p.64.
  - (3) Report of the Fact-Finding Committee (Handloom and Mills), Calcutta 1942, p.123

(4) Ibid, p.1264.

(5) Explanatory Memorandum on the Budget of the Central Government for 1957-58, op.cit., p.148.



while a sari 50" x 9 yards by powerloom takes only 3 hours (1).

C. Powerlooms (Fig. 81) In this State six powerlooms were installed in 1930 which increased to 797 in 1939 and after 1939, 413 new looms were installed. Thus the total became 1,210 (2). Out of them only 75 were new and the rest second hand.

These powerlooms produce cloth from mill-made yarn only. The average annual yarn requirements are 5.48 million pounds while that of handlooms 25.2 million pounds (3). The variety of cloth produced by powerlooms in this State is only coloured saris as there is no market for any other varieties (4). The total production of powerloom cloth in Madhya Pradesh relating to these 1,210 looms was 1,251,600 yards in 1951-52 and 1,309,900 yards in 1952-53 (5).

For the session 1957-58, the Government of India has "decided to instal a limited number of powerlooms in the Handloom sector under the co-operative field. Assistance by way of grants and loans will be given to weavers for purchase of powerlooms, setting of processing factories, training centres, etc. and for providing working capital and share capital" (6).

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- (1) Report of the Fact-Finding Committee, op.cit., p.331.
  - (2) Textile Enquiry Report, Vol.III, op.cit., p.1371.
  - (3) Programme of Industrial Development, 1951-56, op.cit., p.207.
  - (4) Textile Enquiry Report, Vol.III, op.cit., p.1266.
  - (5) Ibid, p.1268.
  - (6) Explanatory Memorandum on the Budget of the Central Government for 1957-58, op.cit., p.108.

The question is whether there will be much change-over from handlooms to powerlooms if cheap electricity is available. If so, is it desirable? Handloom interests, some of the States Directors of Industries, some States Registrars of Co-operative Societies, all States Labour Commissioners and some of the State Governments including Madhya Pradesh Government do not agree with the change-over. One of the main reasons given by them is that this change-over will increase unemployment. Millowners' Associations, Powerloom Associations, Chambers of Commerce and others think that this change-over is desirable (1). The main arguments given in favour of powerlooms is that this provides full-time employment while handlooms is only part-time occupation. Handloom in Madhya Pradesh provides whole-time employment to 75% and part-time to 25%, while Powerloom 100% (2).

Under the first five-year plan "the principle of a common production programme for large-scale and small-scale industries was accepted" (3). To achieve this objective certain steps were proposed to be taken. These were:- the prohibition of certain varieties of cloth mill production

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(1) Textile Enquiry Committee Report, Vol.III, op.cit., pp.1411 & 1412.

(2) Textile Enquiry Committee Report, Vol.III, op.cit., p.1450.

(3) Report of the Village and Small Scale Industries (Second Five-year Plan) Committee, Delhi 1955, p.6.

(3) Report of the Village and Small Scale Industries (Second Five-year Plan) Committee, op.cit., p.7.

in April, 1950, reservation of it for the handloom industry, prohibition of mill production of dhoties beyond a certain limits in December 1952, imposition of a special cess on mill cloth under the Khadi and other Handloom Industries Development (Additional Excise Duty on Cloth) Act, 1953, to give assistance to Khadi and handloom industries and an additional excise duty under Dhoties (Additional Excise Duty) Act 1953 on the bordered dhoties produced by large mills (1). How far the Government's effort to help the handloom industry, at least in this State, can be judged over State Department of Industries Report 1953. "There was no improvement", complains the Industries Report, "in the conditions of the handloom industry. Attempts were made to induce the handloom weavers to take up in their own looms the manufacture of the varieties of textiles reserved exclusively for handlooms but the response was very poor" (2)

In 1954, 5,000 million yards were produced by mills, 200 million yards by registered powerlooms and 1,300 million yards by handloom in India, bringing the total to 6,500 million yards (3). At the end of the first plan period (1955-56), the production of mills and registered powerlooms remained

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- (1) Report of the Village and Small Scale Industries Committee, op.cit., p.7.
  - (2) Annual Report on the working of the Department of Industries, M.P., for the year ending 31st March, 1953, Wagpus 1954, p.1.
  - (3) Report of the Village and Small Scale Industries (Second Five-year Plan) Committee, op.cit., p.7.

same, due to the Government action, and the production of handloom increased to 1,550 million yards, thus the total production from all three sectors being 6,750 million yards. The Village and Small Scale Industries Committee is of the opinion that the total demand by the end of the second plan period (1960-61) would be 8,450 million yards and thus the increase over 1955-56, would be 1,700 million yards. The Committee recommended "that production by mills and power-looms should be limited to the level already reached, i.e., to 5,000 million yards (assuming an export target of 1,000 million yards) and 200 million yards respectively and all the increased demand during the plan period should be met by expansion of handloom production. Such steps as are necessary to maintain mill production at the level of 5,000 million yards may be taken" (2). At the time of the formulation of the second plan, the commission was not able to determine the programme of production by the sectors as there were several aspects under consideration at that time (3). The problems involved are: to bring into use idle handlooms, increase the number of working days, and increase the output

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(1) Report of the Village and Small Scale Industries Committee, op.cit., p.34.

(2) Ibid, p.35

(3) Second Five-year Plan, op.cit., pp.443 & 444.

(1) Indian Trade Journal

Calcutta, p.444.

(2) Census of India, 1951

op.cit., p.717

(3) Indian Textile Journal

per loom. To increase the production from 4 years to 6 to 8 yards a day, it is necessary to introduce technical and other improvements.

The Central Minister of Commerce and Industry addressing the All India Handloom Board at Bombay on July 27, 1957, said that "an additional quantity of 1,000 million yards of cloth, including 300 million yards from Ambar Charkha yarn, had been required to be produced by the handloom industry by the end of the second plan period". (1)

All the sectors of textile industry have problems of their own. Capital, in varying degree, is common to all of them. Under the post-war industrial schemes, the establishment of six new textile mills in this State was sanctioned by the Government of India. (2) Since the sponsors were not able to raise required capital, they have not yet come into existence. A new mill at Jabalpur came under construction during the year 1948-49, but still has not gone under production (3). Other main problems of mill industry are rationalisation, rehabilitation and modernisation of plant and equipment. Rationalisation is vigorously and vehemently opposed by the various Trade Unions on the ground of an increase in unemployment. After the war there was "a gradual decline in the production of the textile mills due to the continuous

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- (1) Indian Trade Journal, Vol.201, No. 6. August 10, 1957, Calcutta, p.461.  
 (2) Census of India, 1951, Vol. VII, M.P. Part IA - Report, op.cit., p.355.  
 (3) Indian Textile Industry, 1955-56 Annual, op.cit., p.XXXIX.



overworking of the machinery during the war period and the non-replacement of worn-out machinery and high prices of new textile machinery" (1). To the Government of India, the Millowners have "suggested a vigorous policy of rehabilitation and modernisation of plant and equipment in mills in order to undertake additional production" (2). The Planning Commission at the commencement of the first plan accepted that the majority of the machinery "had outlived its period of efficient and economical service" (3). For that purpose the Government of India appointed a Working Party for the Textile Industry in 1950. "It recommended that high priority should be accorded to the rehabilitation of plant and equipment and remodelling some of the existing buildings of the industry" (4). For this purpose "The National Industrial Development Corporation has been assigned the task of assisting financially the rehabilitation programmes....." (5).

Handloom and powerloom sectors have common problems. These are un-organised, widely dispersed work places. Finance, supply of raw materials, marketing, obsolete and inefficient

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- (1) Census of India, 1955, Vol.VII, Part A-A, op.cit., p.355.
  - (2) The Times of India Year Book, 1956-57, op.cit., p.195.
  - (3) Programme of Industrial Development, 1955-61, op.cit., p.345.
  - (4) Ibid, p.345.
  - (5) Ibid, p.345.

(1) Report on the working of the Co-operative Societies in the Central Provinces and Berar for the period from 1st July, 1947 to 30th June, 1949. Nagpur 1951, pp.64 and 65.



tools, and absence of the standardisation, research laboratories and technical education are the main problems. To solve these questions, the Central and State Governments are trying to set up Co-operative Societies and inducing the workers to join one or the other on a voluntary basis. Besides this, the Government has set up technical education centres at suitable places. In 1949, there were, 1,146 Non-Agricultural Co-operative Societies with 127,351 members in this State. Societies bearing on the above problems included credit Societies 222, weavers' 228, Production and Sale 89, Thrift 26, and General Purposes 4 (1). It may be added here that more or less the same are the problems for all types of Small-scale and Cottage industries.

## 2. Cotton Ginning and Pressing Factories (Fig.80).

It was in 1887-8 that ginning by steam power was started in Berar. The number of factories then was 4, which increased to 121 by 1901. In the rest of the State it was started in 1891 with 16 factories which increased to 147 by 1901. Thus the total number in the whole State at the beginning of the present century was 268. This increased to 617 by 1929 to get down to 381 in 1940. It indicates that it was not necessary to have such a large number of factories to

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(1) Report on the working of the Co-operative Societies in the Central Provinces and Berar for the period from 1st July, 1947 to 30th June, 1949, Nagpur 1951, pp.64 and 65.

handle the cotton grown in the State. The large number of factories in 1929 reflects the cotton boom of 1920-28 when the cotton price was very high. The economic depression of Thirty's resulted in the fall in prices and consequent shrinkage in cotton acreage and decrease in ginning and pressing factories. By 1950, the number decreased to 249 which again increased to 325 in 1951. Recent increase is due to the increase in cotton acreage. The distribution of the 325 ginning and pressing factories in the State in 1951, is shown in the table below (1).

Table No.71 Showing the distribution of ginning and pressing factories in M.P. in 1951.

<u>District</u>	<u>No.of Factories</u>	<u>District</u>	<u>No.of Factories</u>
Akola	56	Hoshangabad	7
Amaravati	51	Nagpur	20
Buldana	67	Nimar	31
Chanda	4	Wardha	28
Chhindwara	2	Yeotmal	<u>59</u>
		TOTAL	<u>325</u>

Out of these 325 factories, 312, or 96% are located in the cotton zone, 9, or 2.8% in the wheat zone and 4 or 1.2% in rice zone. The districts of Chhindwara and Hoshangabad of the wheat zone and Chanda of the rice zone have ginning and pressing factories as significant acreage in these districts is under cotton.

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(1) Large Industrial Establishments 1950 and 1951, op.cit. pp.8-11 and App.p.2.

In view of the fact that "the ginning and pressing factories play an important part in determining the quality" of cotton, it is suggested that the "factories should be modernised with a view to securing greater efficiency" (1).

3. Rayon. Though Madhya Pradesh is placed in a happy position for the establishment of a rayon industry, it has none at the present and India has only 4. Three factories at Alwaye (Travancore), Kelyan (Bombay), and Nagda (Gwalior) are producing viscose rayon while the fourth at Kaghazanagar (Hyderabad) makes acetate rayon.

For the manufacture of viscose rayon, the principal raw materials are pulp, caustic soda, carbon disulphide and sulphuric acid, while for acetate rayon, cotton linters or alternatively wood pulp or short staple cotton, acetic acid, acetone and sulphuric acid.

As far as pulp is concerned, the State has started to manufacture bamboo pulp for the paper industry. The Technological Laboratory, Bombay, has experimented and proved that bamboo pulp can "be very promising material for rayon" (2). Madhya Pradesh is very rich in bamboo resources. Still there is some drawback. "The cellulose content of bamboo", says the Report, "is very nearly the same as that of wood, but

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(1) The Provincial Industries Committee Report, 1945, op.cit., p.40.

(2) Report of the Panel on Artificial Silk and Rayon Industry, Simla 1947, p.6.

ash content of the pulp made from it is found to be somewhat higher than that of the imported pulp." (1) But bamboo has an advantage over wood. While bamboo is a two to five yearly crop, wood can be utilized for pulp only after forty to sixty years.

The cellulose bearing materials found in Madhya Pradesh are cotton, bamboo and sann hemp. Since this State does not possess softwood, wood pulp for rayon industry is not available. The cheapest raw material is cotton linters, being a by-product of the cotton seed oil industry. It is estimated "that on an average about 2% of linters can be obtained from cotton seed". (2) This State has a supply of 0.9 million tons of cotton linters per annum. (3) It has also short staple cotton. Regarding the chemicals, it has been recommended that plants be set up for the manufacture of sulphuric acid and caustic soda. If the State takes up the destructive distillation of wood, as advised, she will have her own supplies of acetic acid and acetone.

In deciding the location of rayon industry, the main consideration should be its proximity to chemical works, since for the manufacture of one ton of viscose rayon, about twenty tons of chemicals are required. (4) Hence, it will be cheaper

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- (1) Report of the Panel on Artificial Silk and Rayon Industry op.cit., p.3.
  - (2) Report of the Panel on Oils and Soaps Industries, No Imprint, n.d., p.13.
  - (3) Programme of Industrial Development, 1951-56, op.cit, p.228.
  - (4) Report of the Panel on Artificial Silk and Rayon Industry op.cit. p.9.

and safer if the industry is located near chemical works. Further, it should be linked with the development of the chemical industry. The Panel on Artificial Silk and Rayon Industry recommended the districts of Chanda and Hoshangabad as suitable location for this industry. But it admitted "that the Panel had no opportunity of inspecting any of these sites and that proper surveying should be done before a particular site is finally selected". (1)

4. Jute Mill (Fig. 80) There is a jute mill at Raigarh. It is a postwar enterprise. It has 1,500 looms and 3,326 spindles and the production capacity is 4,500 tons per annum. The average number of workers employed daily in 1951 was 850. In 1949, the mill production was 3,778 tons. (2) Neither in Madhya Pradesh nor in the neighbouring districts of adjacent State, is any jute **grown**. One of the substitutes for jute is **sann** hemp. This State had on an average for the triennium ending 1949-50, 85,379 acres. (3) This mill is utilizing it as a substitute for jute and owes its location to proximity to the sown hemp region.

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- (1) Report of the Panel on Artificial Silk and Rayon Industry, op. cit., p.19.  
 (2) Census of India, 1951, Vol. VII, IA - Report, op.cit., p.358.  
 (3) Indian Agricultural Statistics 1949-50, Vol. II, Calcutta 1955, p.251.



5. Leather Industry. (Fig. 71) Leather tanning and the production of leather are cottage industries in M.P., and are carried out by crude methods. This State has large resources of hides and skins and large quantities of tan stuff, but still the industry is at its crude stage. Till 1945, Madhya Pradesh was exporting raw hides and skins on an average about 3,500 tons a year, while if the resources were fully tapped, 12,000 tons would have been available considering the cattle population. Not only raw hides and skins are exported but also large quantities of tan stuffs.

In 1945, there were six small tanneries in M.P. with a compliment of about 400 persons, all doing very inferior tanning. In 1947, the production of hides and skins in M.P., including the Eastern and Merged Indian States, was as shown in the table below. (1)

Table No. 72. Showing the annual production of hides and skins in M.P. and Eastern and Merged States.

	<u>Buffalo hides</u>	<u>Cow Hides or keps</u>	<u>Goat Skins</u>	<u>Sheep Skins</u>
M.P. (excluding Indian States)	0.64	1.29	1.13	0.13
Eastern and Indian States merged in M.P.)	0.30	0.47	0.71	0.18

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(1) Report of the Panel on Leather and Leather Goods,  
New Delhi 1947, p.5.



The factors responsible for Indian hides and skins being generally of inferior quality are :-

- (1) Generally inferior breeds of animals
- (2) Malnutrition of the animals,
- (3) Maltreatment of the animals,
- (4) Animal diseases,
- (5) Allowing the cattle to linger on till old age,
- (6) Negligent flaying, and
- (7) Defective curing for preservation.

During the prewar period, 27 per cent of Keps (cow, bullock and bull hides and calf skins) and 85 per cent of skin were obtained from slaughtered animals and the rest from dead animals. (1) The Indian hides are of inferior quality, being obtained mainly from dead animals. (2) The Planning Commission observes that "In the post-partition period, the tanning industry has been suffering from continuous shortage of hides ... Now that it has been decided that un-productive cattle should be cared in gosadans and protected from slaughter, it is not possible to visualise any large-scale increase in the domestic supplies of hides". (3) This was the comment of the Planning Commission in 1950-51, at the time of the

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(1) Leather Industry in India, Bombay, 1948, pp.25 and 27.

(2) Ibid, p.36.

(3) Programme of Industrial Development, 1951-56, op.cit., p.167.

formulation of the first plan. At the time of the formulation of the second plan in 1955-56, the Commission says that "The inadequate supply of raw hides has persisted during the First Plan period on account of the progressive decline in the slaughter of cattle in the country. The import of raw hides has gone up considerably during 1954-55 and the first ten months of 1955-56". (1)

In 1945, the Provincial Industries Committee recommended the establishments of three modern tanneries to be located in Nagpur, Jabalpur and Raipur. These establishments should produce both vegetable and chrome tanning. With these tanneries are to be attached shoe factories and taxidermees. No action has yet been taken on these recommendations. In both plans, no new units have been sanctioned as the productive capacity of the present units in India is sufficient to meet the demand till the end of the second plan period.

6. Flour Mills. (Fig. 78) There are only 5 mills shown in the Large Industrial Establishments in India, 1950 and 1951, one in Bilaspur and 2 each in Jabalpur and Raipur. The average total number of workers employed daily in 1951 in four of them was 138 (the figure of one mill in Jabalpur is not available). Out of these three districts,

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(1) Programme of Industrial Development, 1956-61, op.cit., p. 269.

only Jabalpur is in the wheat zone, the other two, Bilaspur and Raipur, are in rice zone. As a matter of fact, it is a small scale industry and "A large number of small flour mills have sprung up in towns and in some of the larger villages during recent years." (1) The statistics of this industry is not available and, therefore, no comment or suggestion can be made.

7. Rice Mills. (Fig 78) In 1929-30, there were 33 rice hulling mills. (2) By 1951, the number increased to 305 with the average total number of workers employed daily in 1951 in 240 of them was 4,289 and their distribution is shown in the table below. (3)

Table No. 73. Showing the distribution of rice mills in M.P.

District	<u>No. of mills</u>	District	<u>No. of mills</u>	District	<u>No. of mills</u>
Balaghat	31	Chanda	7	Nagpur	3
Bastar	2	Chhindwara	3	Raigarh	23
Bhandara	74	Durg	28	Raipur	69
Bilaspur	62	Jabalpur	2	Surguja	1

Out of these 305 rice hulling mills, 297 are located in the rice zone, 5 in wheat zone, and 3 in cotton zone. These are mostly small sized mills and work during the season only.

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(1) Report of the C.P. Provincial Banking Enquiry Committee 1929-30, Vol.I, Op.cit., p.224.

(2) Ibid, p.222.

(3) Large Industrial Establishments in India 1950 and 1951, op.cit., pp.31-33 and App. p.8.

8. Dal Mills. (Fig. 78) The third small sized mill based on grain products is dalmills (splitting of pulses). There were 62 mills in 1951, located in the following districts:-

Amravati	4	Hoshangabad	30	Nagpur	2	Sagar	2
Durg	1	Jabalpur	6	Raipur	15	Wardha	2

It is striking to note that about 48 p.c. of the mills are concentrated in one town only (Hoshangabad) and about 24 p.c. in Raipur. Such a large concentration of mills in Hoshangabad cannot be accounted for on purely geographical grounds. There are 3 other districts in this State having average area under all pulses greater than the Hoshangabad average as shown below. (1)

Durg	916,180 acres	Bilaspur	651,924 acres
Raipur	686,949 "	Hoshangabad	539,972 "

In view of the fact that pulses constitute one of main item of diet of overwhelming majority of the population, this industry can be expanded all over the State, if cheap electricity is available. This is one of the industries which is to be based on small scale to make it economical. This will save haulage charges. If the pulses are brought from the interior of the villages for big mills located in towns and after having been converted into splitted pulses are sent back to villages, the price will be increased without any gain.

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(1) Indian Agricultural Statistics, 1949-50, Vol.II, Calcutta 1955, pp 244 and 250.

9. Linseed Fibre. While dealing with agricultural commodities, it was pointed out that in foreign countries linseed is grown for linen fibre also. Further, it was shown that it is doubtful if it can be grown under Indian conditions to give a sufficient satisfactory yield per acre of flax of good quality. Nevertheless some experiments were conducted to show the possibility of profitable cultivation of linseed for fibre. This was the situation in 1952-53. At present the straw has no economic value in India and in some places **it is used as a fuel.** It has been proved "that it is practical proposition to extract fibre from linseed plants and to put it to various uses". (1) The various uses in which it can be put are (1) twines and ropes (2) upholstery material (3) paper mills for making high grade paper (parchment paper and cigarette paper), (4) jute mills as a good sacking material and to a limited extent to mix with jute to produce hessian, (5) cotton mills to mix up with various proportions of cotton, (6) niwars for weaving beads, (7) thick cloth for covering and transporting agricultural products and rough blankets, (8) cloth suitable for towels, bed covers etc. and (9) pulp and bricks (pulp for paper manufacture and unbreakable toys and converting of the pulp into bricks for

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(1) Report on the Marketing of Linseed in India, Delhi 1956, p.130.



transportation which later can be reconverted into pulp). The estimated weight of straw is about  $2\frac{1}{2}$  times the weight of seed. (1)

The Report on the Marketing of Linseed in India says that "In view of the great potentialities of the extraction and utilization of fibre it may be worthwhile for the Indian Central Oilseeds Committee to explore the possibilities of popularising the extraction of fibre in the main linseed producing areas. For this purpose, it may perhaps be necessary, in the beginning to open a few demonstration centres in the important growing areas." (2) It will not only open new avenues for different industries, it will add to the income of growers and thus reduce the cost of production of linseed oil and ultimately India would be in a position to compete in the world market. In view of the fact that M.P. tops the linseed acreage in India, this State is most favourably placed to start its exploitation. In M.P. the best locality would be the junction where the boundaries of the district of Durg, Raipur and Bilaspur meet. These three districts together contribute 47% of the linseed acreage of the State. The other can be any central position in the

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(1) Report on the Marketing of Linseed in India, op.cit., p.134.

(2) Ibid, p. 134.



districts of Balaghat, Bhandara, Chanda, Wardha and Nagpur. These five districts cover 29% of the linseed acreage of the State. It would have been observed under Forest and Forestry that out of the total area of 13027 square miles of the State, the forest area is 66,551 square miles, 51.30% of the State area. This State possesses the highest area under forest among all States of India. The next highest is Assam with only 30.4 thousand sq. miles, followed by Madras with 20.8 thousand and Bombay with 20.6 thousand. In 1950-51, these forests supplied about 13.4 million cu. ft. of timber, about 14 million cu. ft. of roundwood and 38.5 million cu. ft. of firewood, besides large quantities of bamboos and cane, fodder and grazing, gums and resins, tanstuffs and dyestuffs and miscellaneous sorts of minor produce including animal products. It may also be noted here that there are four types of forests in this State - teak, sal, mixed (Sal and teak) and sub-type, (Palas, Salai, Khain, etc.) The commercial utility of different types of trees found in these forest have already been discussed in an earlier chapter.

(Figs 82-86)

I. Industries based on Forest Products

It would have been observed under Forest and Forestry that out of the total area of 13027 square miles of the State, the forest area is 66,851 square miles, 51.30% of the State area. This State possesses the highest area under forest among all States of India. The next highest is Assam with only 30.4 thousand sq. miles, followed by Madras with 20.8 thousand and Bombay with 20.6 thousand. In 1950-51, these forests supplied about 13.4 million cu ft. of timber, about 14 million cu.ft. of roundwood and 88.5 million cu.ft. of firewood, besides large quantities of bamboos and canes, fodder and grazing, gums and resins, tanstuffs and dyestuffs and miscellaneous sorts of minor produce including animal products. It may also be noted here that there are four types of forests in this State - teak, sal, mixed (Sal and teak) and sub-type, (Palas Salai, Khain, etc.) The commercial utility of different types of trees found in these forest have already been discussed in an earlier chapter.

Report of the Forest Policy Committee, M.P.,  
Wagpur, 1952, p. 96.

With this vast supply, the only industry exploiting the forest resources on large scale has been saw milling. The only commercial enterprise of any magnitude was supplying of sleepers to Indian railways. It was only in 1952 that a paper mill went into production and in 1956 newsprint. Commenting on the situation in 1945, the Provincial Industries Committee says: "We do not of course ignore the large development of the saw mill industry that has taken place recently but this is entirely a war measure." (1) Further the Committee observes: "It is astonishing that even good wooden handles of agricultural implements, such as pickaxes, spades, hoes, hammers, etc. have to come from Europe and America, which is a sad commentary on our enterprise." (2) The Forest Policy Committee forecasts that "it may, with confidence, be predicted that in her vast forests, Madhya Pradesh has an asset of immense potential value which holds out a bright promise for the future." (3)

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- (1) Provincial Industries Committee Report, 1945, op cit., p. 51.
  - (2) Ibid., p. 51.
  - (3) Report of the Forest Policy Committee, M.P., Nagpur, 1952, p. 96.

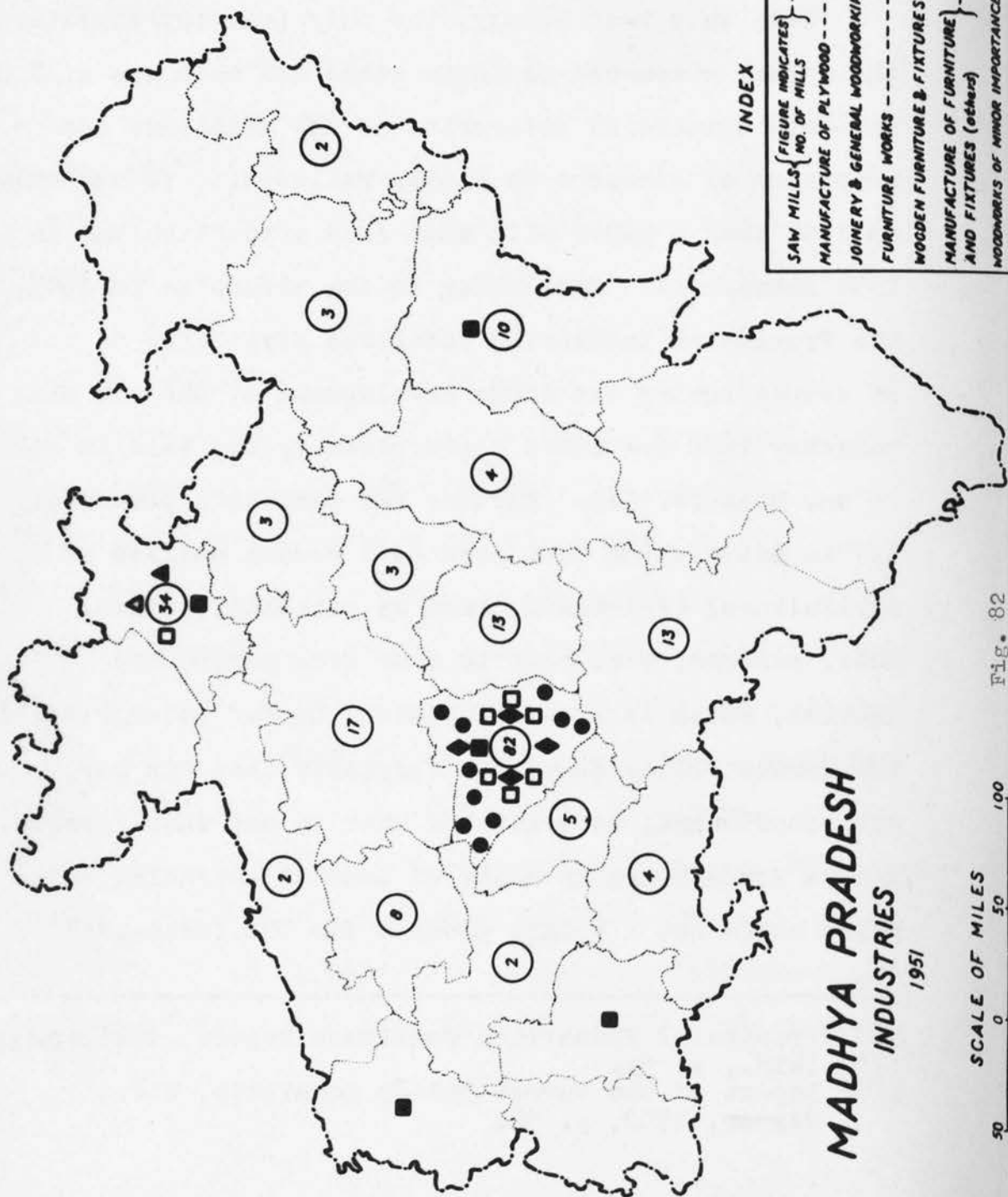


Fig. 82

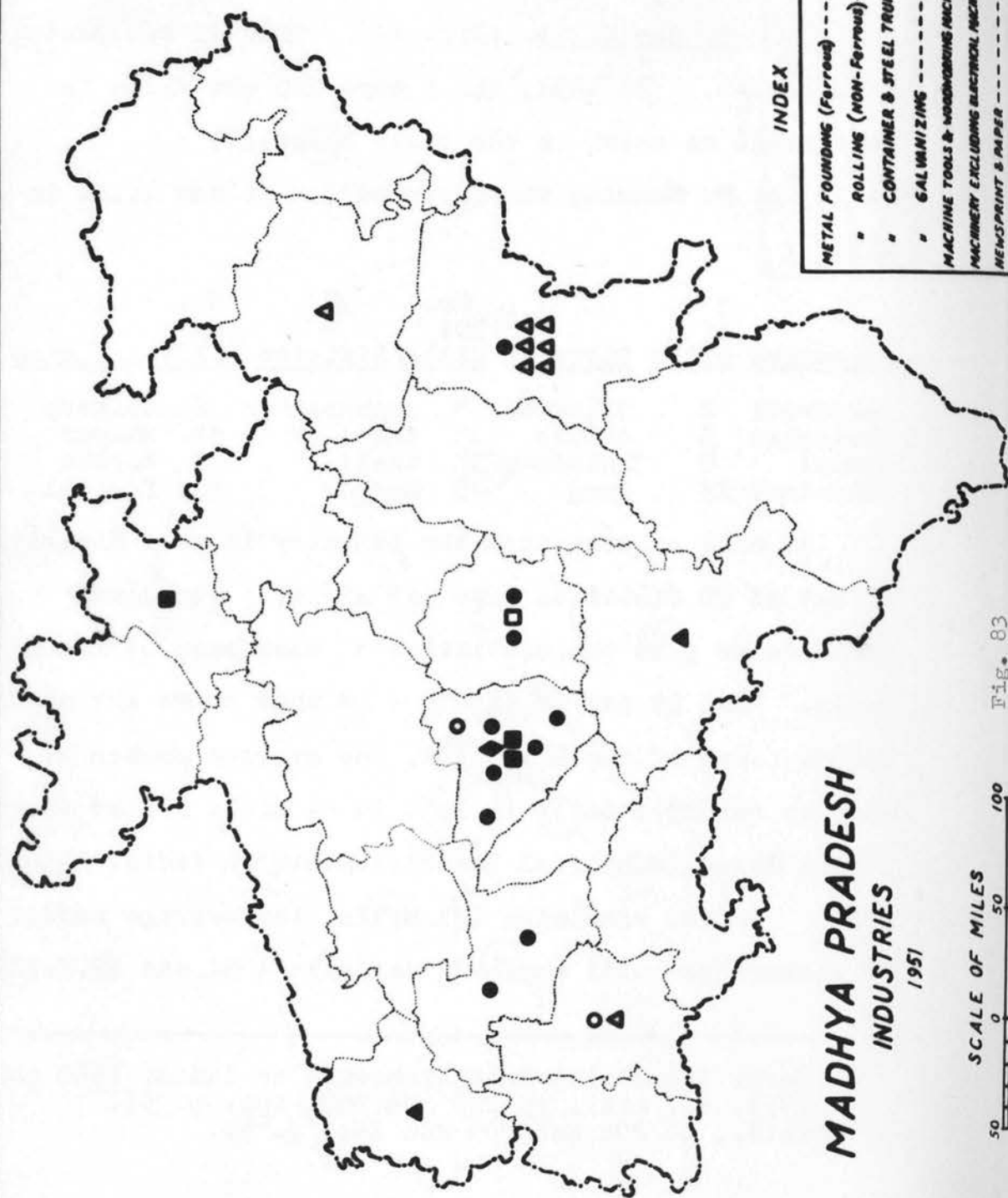
1. Saw Mills. (Fig. 82) This is war period development. In 1951, there were 205 saw mills in this State as shown in the table below.(1)

Table No. 74 Showing the distribution of saw mills in M.P.

<u>District</u>	<u>No. of Mills</u>	<u>District</u>	<u>No. of Mills</u>	<u>District</u>	<u>No. of Mills</u>	<u>District</u>	<u>No. of Mills</u>
Amravati	2	Bilaspur	3	Hoshangabad	2	Raigarh	2
Balaghat	3	Chanda	13	Jabalpur	34	Raipur	10
Betul	8	Chhindwara	17	Mandla	3	Wardha	5
Bhandara	13	Durg	5	Nagpur	81	Yeotmal	4

It will be seen that the industry is well distributed - 16 out of 22 districts have saw mills. It is not possible to give the statistics of wood sawn by these mills. But it can be safely said that these are small units. Out of the 205 mills, the average number of workers employed daily in 1951 in 84 mills is not shown in the Large Industrial Establishments in India, 1950 and 1951. In the remaining 121 mills, the average number of workers per mill employed daily in 1951 was 12.7.(2)

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- (1) Large Industrial Establishments in India, 1950 and 1951, op. cit., pp 208 and 209, App. p. 35.  
 (2) Ibid., pp 208 and 209 and App. p. 35.



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## MADHYA PRADESH INDUSTRIES 1951

SCALE OF MILES  
50 0 50 100



The highest number employed was 97 in the Government Saw Mill, Allapali, District Chanda, and the lowest one at Patel Ramji, and Meghi Co., Nagpur. But this industry seems to be expanding as, of the 205 mills, no less than 74 appeared for the first time as active in 1951. It is obvious that most of them are uneconomic unit and there is some need to reorganise and reorientate the industry to put it on a sound footing.

## 2. Paper and paper board and newsprint.

(Fig. 83). Handmade paper is an old industry of India, and mill-made paper a modern one. The modern industry is concentrated in the Hoogly district of Bengal. (1) The handmade industry is scattered all over the country as a cottage industry. In this State there are 2 areas having this industry - Panchamnagar (District Sagar) and Zainabad (District Nimar). Papers produced are very durable. (2)

Paper is manufactured from various raw materials but chiefly from bamboo in India. Other main raw

- 
- (1) Manufacturing Industries, National Planning Committee, Bombay 1947, p. 124.  
 (2) The Commercial and General Directory of C.P. and Berar, 1938, op. cit., pp. 381 and 382.

materials required for paper manufacture are coal, burnt lime, salt cake and caustic soda. For one ton of finished paper,  $2\frac{3}{4}$  tons of air-dry bamboo, 5 tons of coal, 5 cwts. of burnt lime, 2 cwts. of salt cake and  $1\frac{1}{2}$  cwts. of caustic soda are required. Some other chemicals in small quantity are also needed. This State possesses large quantities of bamboo, coal and lime. It can also produce its own caustic soda, obtaining bleaching powder as a by-product. Recently the Forest Research Institute, Dehra Dun, has made further studies and, according to them, 67 to 70 tons of cheap paper can be manufactured with one hundred tons of bamboo.(1) Trial has also been made of the production of paper from wattle wood. It was found "that 54.6 per cent of bleached pulp could economically be obtained from the wattle wood as compared to a yield of 38.4 per cent of bleached pulp from bamboo."(2)

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(1) Journal of Industry and Trade, Vol. VI No. 11, November 1956, New Delhi, p. 1686.

(2) Ibid., p. 1686.

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(1) Programme of Industrial Development, 1955-61, op. cit., p. 295.

But still bamboo is better, as bamboo offers three to five yearly cutting while wood may only be cut fifty to sixty years. For wood, one is to make the plan sixty years ahead while for bamboo only 3 to 5 years.

Till February 1951, out of the 17 paper and paper-board factories in India, none was located in this State. The first paper and straw-board mill for this State was licensed under the first plan and was located at Ballarpur (District Chanda) with an annual rated capacity of 8,000 tons.(1) The scheme was completed in 1952. The estimated requirements for paper and paper board in 1960-61 is about 350,000 tons. During the second plan period, 6 new mills have been licensed in India and permission granted to certain mills to expand their capacity. But no new mill or expansion has been sanctioned in this State. After the implementation of the above schemes (6 new mills and expansion programme) the rated capacity will increase to 377,000 tons against the expected demand of 350,000 tons.

(1) Programme of Industrial Development, 1956-61, op.

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(1) Programme of Industrial Development, 1956-61, op. cit., p. 295.

India is short of wrapping paper and there is a great demand for cheaper varieties. So much so that "old newspaper is being imported into the country in increasing quantities as a cheap wrapping paper." (1) Madhya Pradesh possesses all the raw materials required for wrapping paper and should take up its production.

The National Planning Committee suggested the expansion of handmade paper through organisation on systematic lines so as to produce special types of paper. (2) Being a cottage industry, no figures are available for handmade paper. The All-India Khadi and Village Industries Board has taken up the programme for implementation during the second plan period. The Board expects that about 4,000 tons of paper will be manufactured by different centres by 1960-61. Further, it "has suggested the reservation of blotting, bond, drawing and filter papers exclusively for the cottage sector in the Second Plan." (3)

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- (1) Programme of Industrial Development, 1956-61, op. cit., p. 299.
  - (2) Manufacturing Industries, op. cit., p. 126.
  - (3) Programme of Industrial Development, 1956-61, op. cit., p. 299.

1956, the mill has started producing its own chemical pulp. (1) At the beginning of the first plan, India was producing no newsprint. At the time of the formulation of the first plan, Nepa Mills (Chandni, District Nimar), the first newsprint of India, was expected to produce newsprint during 1953 and to meet the internal demand up to 27,000 tons from 1954 and onward. (1) Owing to financial and other difficulties, the mills did not go into production according to schedule "and experimental production commenced from January 1955, making use of mechanical pulp from the factory and imported chemical pulp." (2) The rated capacity of the mill is 30,000 tons of newsprint and the target production during the First Plan was 27,000 tons. But the estimated production in 1955-56 was only about 4,200 tons. (3) It is expected that the target production should have been reached by the end of 1957. (4) Since January

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(1) Programme of Industrial Development, 1951-56, op. cit., p. 176.

(2) Programme of Industrial Development, 1956-61, op. cit., p. 293.

(3) Ibid., p. 293.

(4) The Times of India Directory and Year Book, 1957-58, Bombay, p. 253.

1956, the mill has started producing its own chemical pulp.(1) According to the Indian Commerce and Industry, London, the mill "is now producing newsprint wholly from indigenous raw materials."(2)

The Nepa Mill is situated 325 miles northeast of Bombay. The mill is equipped with groundwood and chemical mill, paper machines, godowns and a modern laboratory. The raw materials used are bamboo and salai wood. The State Forest Department controls the exploitation of Salai and bamboo forests for ensuring a well-planned supply of wood for the mill. About 1,500 acres of land is brought under plantation annually by the Forest Department. Different types of bamboo have been planted in the Mill area for carrying out research. M.P. Electricity Board constructed a modern thermal station with a capacity of 17,500 kw. to facilitate the electric supply to Nepa Nagar and neighbouring towns.

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- (1) India News, April 14, 1956, London, p. 4.  
 (2) Indian Commerce and Industry, No. 8, July 1956, London, p. 20.
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- (1) Programme of Industrial Development, 1956-61, op. cit., p. 175.  
 (2) The Times of India Directory and Year Book, 1957-58, op. cit., p. 193 f.n.



According to the estimates of Mandelin, an F.A.O. expert, the availability of bagasse and the economics of its substitution by other fuels in sugar factories, the extent to which conifers in the Himalayan region or eucalyptus and wattle trees in the Nilgeri areas could be utilised for the manufacture of newsprint, are factors likely to determine the number of newsprint factories that can be established during the next five years and their location. It is, however, expected that at least one new factory of approximately the capacity of the Nepa Mills will come into production during the plan period ..."(1) Since then it has been decided to set up a newsprint factory with a capacity of 30,000 tons a year at Bodhan (Andhra State).(2) There is a huge forest in Andhra State. The total forest area is about 14 million acres. The State possesses bamboo suitable for the manufacture of paper pulp in abundance. important as it gives subsidiary employment to agricul-

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- (1) Programme of Industrial Development, 1956-61, op. cit., p. 175.  
 (2) The Times of India Directory and Year Book, 1957-58, op. cit., p. 193 f.n.  
 (1) *India Year Book of Statistics*, Vol. VI, Pt. 2, September 1956, New Delhi, p. 1362.  
 (2) Report of the Central Provinces Provincial Banking Enquiry Committee, 1929-30, Vol. I, Nagpur 1930, p. 223.

According to the estimates of Sundelin, an F.A.O. expert, the newsprint demand for India by 1962, would be 132,000 tons per year. But in the opinion of the Government of India Planning Commission it is an over-estimation and would be 120,000 tons by 1960-61. Even if the Planning Commission's estimate is taken as correct, and both the newsprint mills (Nepa and Bodham) go into full production by 1960-61, India will be short of 50% of her newsprint requirements. There is scope to set up another mill in this State.

As far as bamboo resources are concerned, after meeting the commitments made to the present two mills of Nepa and Ballarpur, "M.P. has a surplus of one lakh (100,000) tons of bamboo per year to feed a new unit." (1) The Districts of Balaghat and Betul are best suited for the location of a new unit.

3. Bidi. (Fig. 79). This is a kind of cheap Indian cigarette, in which tobacco is wrapped in tendu (*Diospyros metanoxylon*) leaves and is smoked generally by poor people. The collection of tendu leaves is important as it gives subsidiary employment to agriculturist during off-season. (2) This industry got its

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(1) Journal of Industry and Trade, Vol. VI No. 9 September 1956, New Delhi, p. 1362.

(2) Report of the Central Provinces Provincial Banking Enquiry Committee, 1929-30, Vol. I, Nagpur 1930, p. 223.

Table No. 75 Showing the bidi establishments in M.P.

real impetus when the Indian National Congress in 1921 started its non-Cooperation and boycott of foreign goods movement. The Congressmen gave up cigarette smoking and took up bidi smoking (At that time all good cigarettes in India were of foreign make or of foreign concerns manufacturing in India).

It is one of the largest small scale industries in M.P. In 1940, there were 1,100 bidi manufacturing establishment in M.P. with 50,000 persons employed as reported by the Bidi Enquiry Committee, 1941. The daily average output of bidi was 52.5 million. In 1950, the estimated number of persons employed increased to 200,000 persons and daily average output to 180 to 200 million of bidis. The consumption of tobacco in the industry in the same year (1950) was about 14,732 tons per year.(1) According to the Large Industrial Establishments in India 1950 and 1951, there were 363 bidi establishments distributed in various districts of the State as shown in the table **overleaf**.

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(1) Census of India, 1951, Vol. VII, Part IA, op. cit., p. 358.

Table No. 75 Showing the bidi establishments in M.P.

<u>District</u>	<u>No.</u>	<u>District</u>	<u>No.</u>	<u>District</u>	<u>No.</u>	<u>District</u>	<u>No.</u>
Balaghat	1	Buldana	1	Jabalpur	11	Raipur	15
Bastar	9	Chanda	2	Nagpur	43	Sagar	24
Bhandara	174	Durg	25	Nimar	13	Wardha	3
Bilaspur	18	Hoshangabad	12	Raigarh	4	Yeotmal	8

It is significant that 174 out of 363 establishments are located in one district of Bhandara - about 48%.

The only reason for this concentration seems to be that this district, is located in the tendu growing mixed forest zone and is surrounded on three sides by the mixed forests. If the establishments located within the mixed forest district and the bordering districts (Bastar, Bilaspur, Nagpur and Yeotmal) are taken into consideration, 295 out of 363 are located there - 81.2%. So flourishing is the bidi industry that it has created the problem of shortage of agricultural labour in the Bhandara district. The State Government enacted the Central Provinces and Berar Regulation of Manufacture of Bidis (Agricultural Purposes) Act, 1948, to have power to requisition labour for agricultural purposes. But the Supreme Court of India held it ultra vires of the Constitution of India.

It is to be noted that M.P. has an insignificant area under tobacco. The estimated average area and production

for the quinquennium ending 1953-54 was 7.6 thousand acres and 2 thousand tons respectively. Against this production, the consumption in the industry is about 14,732 tons. About 2 lbs. of tobacco is required for the manufacture of 3,100 to 3,200 bidis. (1) The State imports tobacco from the neighbouring States, especially from Bombay. Obviously, the industry flourishes in this State on the other raw material of the industry, i.e. tendu leaves, which is abundant in the State. The Forest Policy Committee thinks that "The quality and quantity of leaves obtained could be increased by cultural treatment. So far no attempts have been made except in the Raigarh tract." (2)

4. Plywood. (Fig. 82) There are two types of plywood manufactured in India - casein-bounded and resin-bounded. Casein-bounded plywood is in demand for tea

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- (1) The C.P. Provincial Banking Enquiry Committee, 1929-30, Vol. II., Calcutta 1930, p.519  
 (2) Report of the Forest Policy Committee, M.P., op. cit., p.87.

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- (1) The Provincial Industries Commission Report, 1934, op. cit., p. 95.  
 (2) Ibid., p. 56.



chests, while resin-bounded of high grade for aeroplanes, coach-building and by the Defence Services for various purposes, also for panelling, for the manufacture of utility furniture, cabinet ware, etc. Chest plywood has a certain sure market depending upon the extent of tea exports. But the commercial plywood is to create its own market.

Theoretically it is possible to make plywood from any timber that can be peeled on a rotary lathe. But practically "the choice is limited to a few species of which large quantities are available in straight lengths and of sufficient girth." (1) The Forest Research Institute, Dehra Dun, tried 7 types of timber grown in this State and found some of them good for general purposes and some for tea-chests. (2) Besides timber, casein or resin, lime, copper sulphate, borax and other chemicals in small quantities are required by the plywood industry. Synthetic resin, viz, phenolformaldehyde and urea-formaldehyde, is used in the manufacture

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(1) The Provincial Industries Committee Report, 1945, op. cit., p. 55.

(2) Ibid., p. 56.

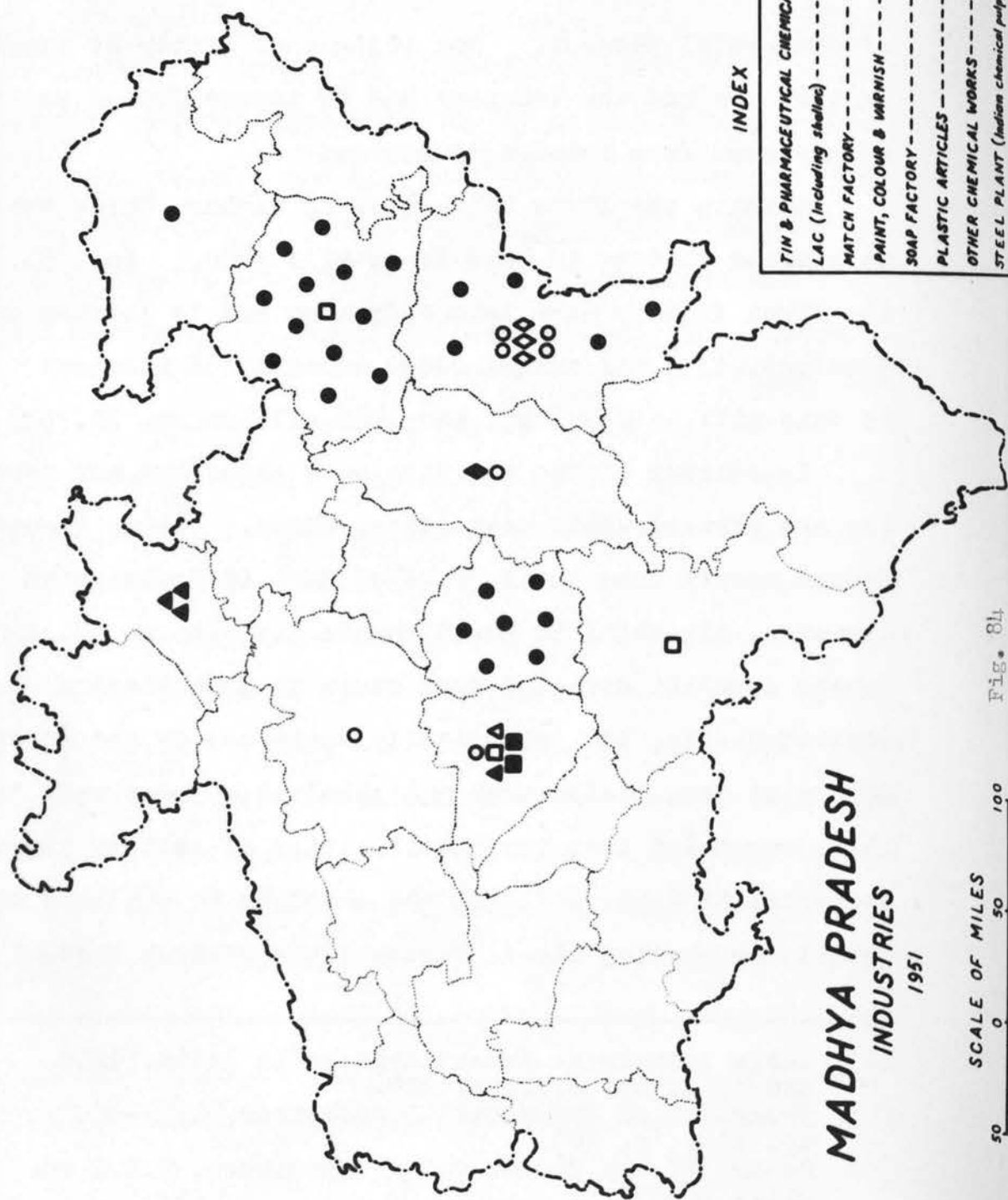


of commercial plywood. The indigenous supply of casein is very low and the industry has to import 75% of the casein requirement from foreign countries.

Despite the State being rich in timber, there was no plywood factory in this State till 1950. In 1951, the first factory came into operation and is located at Jabalpur.(1) The annual rated capacity of teachest in this mill in May 1952, was 1.08 million sq. ft. (2)

In neither of the two five year plans has any scheme for new plywood units been incorporated. Large timber "comes mostly from the forests of Bori in Hoshangabad division, Allapalli in South Chanda division and Malaghat in the Amravati division from where it is collected departmentally, and periodically auctioned at the forest depots of Taku, Ballarshah and Achalpur respectively."(3) It is suggested that the possibilities of setting plywood factories in Taku, Ballarsh and Achalpur be explored and details be chalked out. Further, the present factory

- (1) Large Industrial Establishments in India, 1950 and 1951, op. cit., p. 213.
- (2) Programme of Industrial Development, 1951-56, op. cit., p. 240.
- (3) Report of the Forest Policy Committee, M.P., op. cit., p. 85.



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STEEL PLANT (Indian chemical pulp)	◆

## MADHYA PRADESH INDUSTRIES 1951

SCALE OF MILES  
50 0 50 100

Fig. 84

is located in Jabalpur which is not within the teak forest area. If it is transferred nearer to teak resources, it may be in the interest of economy in the cost of production.

5. Lac and Shellac. (Fig. 84) Lac is an exudation from an insect found on certain trees. The most important trees on which it is found are Ghont (*Zizyphus xylopyra*), Palas (*Butia frondosa*) and Kusum (*Schlichera oleosa*). These forest trees are in abundance in Damoh (District Sagar), Gondia (District Bhandara) and Dhamitaria (District Raipur) and also in some other places. The major part of lac is converted into Shellac. The five industries, gramophone, varnish and paint, electrical, hat as stiffening material, and sealing wax, are the main consumers of Shellac.

In 1951, there were 24 lac manufacturing concerns situated in this State, Bhandara 7, Bilaspur 12, Raipur 4 and Surguja 1.(1) The average production of Shellac in Madhya Pradesh from 1946 to 1956 was 288,111 maunds.(2)

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- (1) Large Industrial Establishments in India 1950 and 1951, op. cit., p. 259 and App. p. 42.  
 (2) The Times of India Directory and Year Book, 1957-8, Bombay, p. 188.

It may be noted that till 1950, India was producing 85% of the world production of Shellac, but now only 30% of the world production.(1)

The note of warning given by the Provincial Industries Committee is worth quoting here. "The chief deficiency", says the Report, "is that Shellac is manufactured principally by cottage and very small scale industry; it is usually subject to adulteration and there is no standardisation."(2) Further it says "that unless the Shellac trade is re-organised and its products standardised the time is bound to come when an efficient product will be synthesised, at a competitive cost. India will then lose a very valuable industry."(3)

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- (1) The Times of India Directory and Year Book, 1957-58, op. cit., p. 188.
  - (2) The Provincial Industries Committee Report, 1945, op. cit., p. 60.
  - (3) Ibid., p. 60.

about 1903, and only one in 1941, and in 1957 there were no furnaces." (1) The Provincial Industries

II Metallic Mineral Industries. There is no modern metallurgical industry in this State, though the State is rich in most of the basic minerals. However, there is one steel project under construction at present. None the less metal working has had a long tradition.

1. Iron and Steel (Fig. 84) Iron smelting has been and is still carried on in the forests by a class of people known as 'agarias' in such districts as Mandla, Raipur, Chanda and Jabalpur. The output is very small. (1) "The aboriginal smith mines or collects the ore which is soft enough to be dug easily with the ordinary hoe and is broken up with blunt end of the pointed hammer." (2) In the northern part of the Sagar district, especially in the village of Tigora, Hirapur, Baritha and Amarman (all of Banda Subdivision) iron ore is found. In 1899, Tigora, Hirapur and Baritha had 46 furnaces, which "diminished to 31 by

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(1) Rural and Cottage Industries, op. cit., p. 175.

(2) Census of India, 1951, Vol. VII Part I-A, op. cit., p. 198.

(4) O.P. Gasetteer 1920, pp. 117, 140, 252, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

(5) Berar Gasetteer, 1870, op. cit., p. 117.

about 1903, to only one in 1933, and in 1937 there were no furnaces."(1) The Provincial Industries Committee of 1945 is of the opinion that Madhya Pradesh "is now perhaps the chief home in India of iron smelting in small indigenous blast furnaces. These furnaces are however now on the decline as will appear from the fact that, while in 1909 Bilaspur had 103, Durg 56 and Raipur 203 of them, in 1937 they had only 59, 6 and 3, respectively."(2) The 1951 Census says that in the three districts of Durg, Surguja and Sagar "people are engaged in smelting the ore and in manufacturing crude implements therefrom."(3) The C.P. Gazetteer of 1870 says that smelting of iron was practised in the districts of Jabalpur, Chanda, Balaghat, Bhandara, Bilaspur, Raipur, Mandla, Hoshangabad, Nimar and Sagar.(4) According to the Berar Gazetteer of 1870, though iron ore was plentiful it was not smelted.(5)

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- (1) Census of India, 1951, Vol. VII, M.P. Part I-A, op. cit., p. 198.
  - (2) Provincial Industries Committee Report, 1945, op. cit., p. 24.
  - (3) Census of India, 1951, Vol. VII, Part I-A, op. cit., p. 203.
  - (4) C.P. Gazetteer 1870, op. cit., pp 1,5,14,18,59, 75,117,140,252,256,270,369,376,390,436,477 and 487.
  - (5) Berar Gazetteer, 1870, op. cit., p. 23.



In 1904, in Madhya Pradesh (less Berar) 441 furnaces were under operation and were producing 2,818 tons of iron.(1) Iron ore is found in every part of the State although it is concentrated in the Chanda - Drug - Bastar area. The Industrial Survey Report of 1908-09, suggested several industries, but there is no mention of this industry in the whole Report.(2) In 1936, the question of establishing an iron-pipe casting industry was considered by the Government but was dropped on the ground "that no firm would take up this business as the Tata Iron and Steel Company had already gone into the question before they founded their iron and steel works at Jamshedpur."(3)

It is interesting to note that the first iron and steel works in India was proposed to be set up by J.N. Tata in this State. Tata, going through the Report of Ritter Van Schwarz, a German expert, thought

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- (1) C.P. Gazetteer 1908, op. cit., p. 58.
  - (2) Report on the Industrial Survey of the Central Provinces and Berar, 1908-09, London 1910.
  - (3) Schemes of the Economic and Industrial Development in the C.P. and Berar Nagpur 1936, p. 33.

(1) Sharma, T.R. - Location of Industries in India, 2nd Edn., Bombay 1943, pp 98-100.

of erecting a modern iron and steel works at Chanda. Further examination by Mr. Weld, on behalf of Charles Page Perin, an eminent consulting engineer of New York, decided to drop the idea as Chanda had no coking coal. Then prospects at Durg were examined. Durg has excellent ore deposits. Coking coal could be brought from the Jharia and Raniganj coalfields. But the absence of sufficient quantity and constant supply of water to cool furnaces made to drop the idea at Durg too. Then Tata investigated the prospects at Padampur (near Sambalpur, Orissa State). But from the operating point of view it was not considered desirable. Ultimately the present site at Jamshedpur (Bihar State) was selected.(1) Since then two scientific advancements have now widened the scope for the development of this industry in this State. Firstly, by the Krupp-Renn process steel can be manufactured direct from the ore without converting it firstly into pig iron. This process is independent of coking coal, and any type of coal can be utilised. Secondly, there is the manufacturing of steel by

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(1) Sharma, T.R. - Location of Industries in India, 2nd Edn., Bombay 1948, pp 98-100.

the electric process, which has been responsible for the swift development of iron and steel industry in Sweden. However, steel making need not depend on these processes, since some coking coal has been found in the Mahanadi area.

The raw materials, viz., superior iron ore, limestone and refractory materials, necessary for iron and steel manufacture, are available in abundance at several sites. It was in 1944 that the possibility of setting up a mill was explored in this State.(1) The Provincial Industries Committee recommended a steel mill either in the Chanda district or the Durg district.(2) For the chanda plant, electricity could be obtained from the local thermal station and for the Durg, from the Chitrakut Hydro-Electric Project.(3) This recommendation was made in 1945 and within two years, there came independence and this along with other recommendations went into cold storage.

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- (1) Das Gupta, A - Economic and Commercial Geography, Calcutta 1955, p. 648.
  - (2) Report of the Provincial Industries Committee, 1945, op. cit., p. 26.
  - (3) Ibid., p. 26.

(2) Second Five Year Plan, Delhi 1956, p. 396.

In 1945, the Government of India set up a Panel to suggest means to set up steel mills in India. It recommended for the establishment of a steel mill at or near Tilda, between Raipur and Bilaspur.(1)

At the commencement of the first plan (1950-51) there were three main concerns in India producing iron and steel - Tata Iron and Steel Company, Jamshedpur, the Indian Iron and Steel Co. (associated with the Steel Corporation of Bengal) at Calcutta and the Mysore Iron and Steel Works at Bhandravati. Under the first plan, the programme included the expansion and modernisation of the existing concerns. During the second plan period, three new mills are to be set up in India - an Indo-German concern at Rourkela (Orissa State), an Indo-British one at Durgapur (West Bengal) and an Indo-Soviet one at Bhilai (Madhya Pradesh). The Bhilai plant in the Durg District "is expected to provide 770,000 tons of saleable steel, heavy and medium products, including 140,000 tons of billets for the re-rolling industry."(2) The Dhalli

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- (1) First Report of the Iron and Steel (Major) Panel, Agra 1948, p. 65.  
 (2) Second Five Year Plan, Delhi 1956, p. 396.

Rajhara iron ores will be utilised for the Rourkela and the Bhilai projects. It is proposed to establish a coal washery to reduce the ash content to 15 p.c. at Bokaro - Kargoli to supply to Rourkela and Bhilai plant. The Bhilai plant will have a daily capacity of 1000 tons of pig iron. The ultimate object is to expand its capacity to 2.5 million tons of ingots annually.(1) The present capacity of the plant is one million tons. But with slight additions of rolling mills, the capacity can be raised to 1.3 million tons. Besides, "the Plant has been so laid out that it can be expanded, in the future, to produce up to 2.5 million tons of ingots."(2)

The estimated annual requirements of various minerals for capacity production in the Bhilai plant will be coal 1.79 million tons, iron ore 1.94 million tons, manganese ore 0.033 million tons, limestone 0.551 million tons and dolomite 0.309 million tons.(3)

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- (1) Second Five Year Plan, Delhi 1956, p. 397.
  - (2) Journal of Industry and Trade, Vol. VI No. 4, April 1956, New Delhi, p. 508.
  - (3) Second Five Year Plan, op. cit., p. 397.

The capacities of the different sections of the Bhilai plant are shown below. (1)

<u>Coal Carbonisation</u>						
<u>Coal Carboni- sation</u>	<u>Coke Produced</u>	<u>Pig Iron</u>	<u>Steel Ingots</u>	<u>Finished Steel</u>	<u>Surplus Pig Iron for Sale</u>	<u>Power Plants Kw</u>
1.650	1.145	1.110	1.0	0.770	0.300	24,000

(figure, except for power plant, in million tons)

It is expected that three coke oven batteries, two blast furnaces, two open hearth furnaces, and a blooming mill of the Bhilai project will be commissioned by December, 31, 1958 and other sections by December 31, 1959. (2)

The Central Minister for Iron and Steel said "a contract had been concluded between India and Russia for the supply of 60,000 metric tons of structural steelwork for the Bhilai Steel Project...The entire supply would be completed by the middle of June, 1959." (3)

By April 1957, equipment and steel structures weighing about 16,000 tons for the Bhilai project arrived from the U.S.S.R.. Temporary water and power supplies have been laid down. The diesel-power station is in operation. A thermal power station, mainly to supply power to the Bhilai

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- (1) Second Five Year Plan, op.cit., p.396.  
 (2) Indian Trade and Industry, Vol. VII, No. 4, March 4, 1955, London, p.80.  
 (3) India News, May 26, 1956, London.



project, is under construction by the Madhya Pradesh Electricity Board. According to the undertaking given by the Board the power would be available by 1958. (1) A railway line has been constructed to connect Bhilai with Dhalli-Rajhara, the site of the iron ore mines.

There is still scope to set up at least two more steel mills in this State. One of them could be located in the district of Chanda. The Chanda deposits of iron ore are <sup>be</sup> estimated to 1,520 million tons. (2) Another can be in the district of Bastar. The Bastar deposits are estimated to be 3,600 million tons. According to the observation by the Deputy Commissioner, Bastar, as quoted in the Census Report of 1951, is that "Almost all parts of Bastar are full of iron ore. Some of it can be classed as amongst the finest and purest in the world." (3) These suggestions are not made with the idea of their being developed just now. Rather they should be considered when there is demand for further expansion.

2. Ferro-manganese. In this State the main areas of manganese ore deposits are Balaghat, Bhandara, Chhindwara, Nagpur and Jabalpur districts. As stated in the Chapter on Mines and Minerals, most of manganese extracted in India is

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- (1) Journal of Industry and Trade, Vol. VI, No. 12, December 1956, New Delhi, p. 1897.  
 (2) India News, March 31, 1956, London.  
 (3) Census of India, 1951, Vol. VII, Part I-A, op.cit, p.198.

exported in raw form. Data on manganese deposits are so contradictory that one is at a loss to reach any decision if he proposes to plan the exploitation of it. Krishnan is of the opinion that the deposits of Nagpur, Bhandara and Balaghat are estimated to be of the order of 100 million tons. Brown and Dey think that the known reserves of manganese ores of high grade in India is only 18 million tons and the low grade may be double this amount. The Provincial Industries Committee, on the one side, says that "At the pre-war rate of extraction, the known reserves will not last more than some 30 years. No further expansion of manganese mining is therefore desirable." (1) On the other side it is claimed that "In spite of our large deposits of manganese it is unfortunate that there appears to be no present prospect of the province being able to manufacture ferro-manganese on a commercial scale." (2) The Planning Commission, realizing the situation incorporated in the second plan a provision for the "continuation of the detailed mapping accompanied by drilling of the manganese ore belt in Madhya Pradesh." (3) According to the estimate made by the Indian Bureau of Mines, the reserves of manganese in India are about 112 million tons. Of this, 100 million

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- (1) The Provincial Industries Committee Report, 1945, op.cit., p.27  
 (2) Ibid., p.28.  
 (3) Second Five Year Plan, op.cit., p.384.

tons lie in this State and the rest (12 million tons) in other areas of the country. (1)

There are two important types of ferro-manganese products, standard ferro-manganese and refined ferro-manganese, produced in the world. But India produces neither of these as Indian manganese ore has high iron content and the Indian coal high phosphorous. "By the careful selection of suitable ones", say Brown and Dey, "which are obtainable from Madhya Pradesh and elsewhere, and a coke such as that yielded by coal from the Girideh coalfield, with its phosphorous content of 0.022 per cent, this difficulty (high phosphorous content of manganese and coal) could doubtless be overcome." (2) In view of this difficulty, the Planning Commission is of the opinion that the Krupp-Renn and Basset processes should be given a trial. By these processes, every type of ore can be utilised, acidic or highly silaceous ore can be treated successfully. Even low grade non-coking coal can serve the purpose and besides producing ferro-manganese of standard grade, it will yield almost an equal quantity of pig iron.

During the first plan period no specific target for the production of ferro-manganese was set. Under the

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- (1) Journal of Industry and Trade, Vol. VII, No. 6, June 1957, New Delhi, p.959.  
 (2) Brown and Dey, op.cit., p.220.

second plan, 9 licences have been recommended by the Planning Commission for the manufacture of ferro-manganese by electric process. Two of them, one at Tumsar (District Bhandara) with an annual capacity of 30,000 tons and the other at Kanhan (District Nagpur) with 10,000 tons, are to be set up in this State. (1) The projects are in the preliminary stage and time of their going into production can not be forecast. The Government of India has now decided that ore should be processed and converted into ferro-manganese before being exported.

3. Aluminium. Madhya Pradesh possesses over 9.7 million tons of bauxite with 50 p.c. or more  $Al_2O_3$ . Reserves containing less than 50 per cent of alumina are expected to be several times the above total. The reserves are distributed as shown below. (2)

Surguja-Jashpur-Bilaspur	6,374,000 tons
Balaghat-Mandla-Kawardha	2,135,000 tons
Bilaspur-Shahdol (Amarkantak area)	620,000 tons
Jabalpur	<u>525,000 tons</u>
Total	9,654,000 tons

Despite this large deposit, the present position is that most of the ore extracted in the State is exported in raw condition to other States of India, especially to Asansol,

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(1) Programme of Industrial Development, 1956-61, op.cit. p.25.

(2) Brown and Dey, op.cit., p.260.

(near Calcutta) or to Uttar Pradesh. Only a small quantity is consumed within the State in the manufacture of fire-bricks in Jabalpur.

The aluminium industry in India, at present is on a very unsound footing. How uneconomic is the production of aluminium in India can be judged by the activities of the foremost company. The Aluminium Corporation of India with its works at Jaykaynar, near Asansol (West Bengal), mines bauxite in the Lohardaga region of Behar, processes it to alumina at Muri (Bihar), makes electrolytic reduction of alumina to aluminium metal at Alupuram, Alwaye (Travancore), rolls the aluminium metal into sheets and circles at Belur (West Bengal) and manufactures aluminium powder and paste at Kalwa (Bombay). (1) Over and above this, calcined petroleum coke for smelter plants has to be brought from Digboi (Assam) to Alwaye and Asansol. (2) This industry has a great future if it can be made cheap enough by eliminating uneconomic methods and waste in taking raw materials over long distances by rail to reduction works. The solution to the problem is to develop cheap electricity in the vicinity of coal and bauxite mines.

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- (1) Nayar, V. G. G. - Aluminium Industry in India, Major Industries of India, Vol. 4, 1954-55, Annual, Bombay, p.201.  
 (2) Programme of Industrial Development, 1956-61, op.cit. p.30.

The high cost of transport is another factor responsible for impeding the development of the aluminium industry. The Heavy Chemicals and Electro-Chemical Industries Panels say "that it is cheaper to ship bauxite from South America to a factory in North Canada than it is to transport it from the Central Provinces (Madhya Pradesh) to a factory in Bihar. Bauxite itself costs little, but the transport charges are much higher." (1)

An aluminium factory can be set up in Katni (railway junction in the Jabalpur District). Electricity can be obtained from the Rewa Project, which is only 76 miles from Katni. The only raw material for the reduction plant required to be imported is cryolite, but this can be produced synthetically in Katni. (2) There are three other important areas having large reserves of ores where industries based on bauxite can be developed. These are Surguja-Jashpur-Bilaspur, Balaghat-Mandla-Kawardha and Bilaspur-Shahdol (Amarkantak area). In these areas the industry can be developed when cheap electricity is available.

It is interesting to note that the National Metallurgical Laboratory at Jamshedpur has developed a process, simple and cheap, of electroplating aluminium with various

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- (1) Report of Heavy Chemicals and Electro-Chemical Industries Panels, Simla, Simla 1947, p.46.
  - (2) The Provincial Industries Committee Report, 1945, op.cit., p.30.



metals. (1) With large resources of aluminium and very limited resources of copper in India, plated aluminium can replace copper, brass or steel for many purposes.

4. Other Non-ferrous Metal Industries. Prior to the World War II the "non-ferrous metal industry was almost non-existent in India and almost all her requirements were met by imports. To help the war effort a few refining and semi-manufacturing plants have been put up which should form the nucleus for a sizeable non-ferrous industry in India." (2) No such industry has developed in Madhya Pradesh, although there are deposits of <sup>certain</sup> non-ferrous ores.

According to D. N. Wadia, formerly Director of Geological Survey of India and the ~~present~~ Mineral Adviser to the Government of India, of the industrially important non-ferrous metals, India has "exportable surplus" of titanium which "can dominate the world market." Magnesite, manganese, beryllium and bauxite are in "exportable surplus." In copper, antimony, arsenic and barytes, India is "self-sufficient for present needs and those of the immediate future." For lead, zinc, tin, nickel and tungsten "India has to depend largely or entirely on foreign imports." (3)

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- (1) Indian Trade Journal, Vol. 201, No. 6, August 10, 1957, Calcutta, p.461.  
 (2) Report of the Industrial Panel on Non-Ferrous Metal Industries, No imprint, n.d., p.9.  
 (3) Wadia, D. N. - The Mineral Outlook in India, Science and Culture, Vol. VII, No. 11, November 1941-42, Calcutta, pp.515-518.

Of these important non-ferrous metals, this State possesses bauxite, manganese, titanium, copper, barytes, tungsten and lead. Manganese and bauxite have already been dealt with, others are briefly surveyed here.

Copper and copper alloys are widely used and there is hardly any industry in which this metal is not used in one form or another. Copper ore in this State is found near Sleemanabad and Nimar (Jabalpur district) and Narshinghpur (Hoshangabad district). The Sleemanabad deposits "were prospected in 1904-8 and again in 1937, but full information about their size and extent is lacking." (1) There is no large deposit of lead ore known in India. But the Panel on Non-ferrous Metal Industries says that there are known occurrences of lead in the Durg district. (2) There are some deposits of barytes in the Jabalpur district. The Indian bauxite deposits "contain appreciable quantities of titanium which can be recovered as a by-product." (3) As far as tungsten is concerned a small amount was mined at Agargaon (District Nagpur) between 1907 and 1914. (4) The information regarding the above mineral is so scanty and incomplete that no suggestion for their exploitation and utilisation in relevant industries can be given.

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- (1) Report of the Industrial Panel on Non-Ferrous Metal Industries, No imprint, n.d. p.9.  
 (2) Ibid., p.30  
 (3) Ibid., p.44.  
 (4) Brown and Dey, op.cit., p.246.

### III. Metal using Industries

1. Structural Fabrication. This is an important specialised industry which needs extensive mechanical equipment, large workshop, trained and experienced engineers and skilled workers. Out of the 69 factories included in the Central list of Steel Processing Industries, which are making structural fabrication, one with a capacity of 108 tons on single shift is located in Madhya Pradesh. (1) During the second plan period "it is proposed to set up a structural-cum-machine shop at Bhilai..." (2) The preliminary work on this project was started some time in 1955-6. If this shop is set up early, it will be able to supply the requirements of the Bhilai Steel Plant in the later stage of its construction.

2. Agricultural Implements. The agricultural implements used in India are of three distinctly different types - Indigenous Agricultural Implements, Improved Agricultural Implements and Power-driven Agricultural Machinery. The table given below shows the agricultural machinery in M.P. as on 31st May 1952. (3)

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- (1) Programme of Industrial Development, 1956-61, op.cit. p.49.  
 (2) Ibid., p.53.  
 (3) Table of Agricultural Statistics for the year ending the 31st May 1952, Nagpur 1955, p.19.

Table No. 76 Showing Agricultural machinery and implements in M.P..

Ploughs	Carts	Ghanis	Sugar Cane Crush- ers.	Tractors	Oil Engines	Electric Pumps
2379628	1366306	11066	11090	738	1712	237

Indigenous agricultural implements belong to the cottage industry and it is presumed that supply is sufficient to meet the demand. But it needs improvement and rationalisation. This work should be taken up by the Agricultural Department. Out of 62 factories manufacturing improved agricultural implements in India, 2 are located in this State. Their annual rated capacity in tons of steel is 300. (1) Besides these "there are in addition a number of other factories engaged in the manufacture of improved agricultural implements in the different States about which no information is available." (2) Of the power driven agricultural implements and machine factories, one, with a capacity of 100 pumps, (centrifugal), is located in M.P. Diesel engines are not manufactured in this State. The question of establishing improved and power driven agricultural machinery should be taken up after the Bhilai Steel plant goes into production.

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- (1) Programme of Industrial Development, 1956-61, op.cit. p.85.  
 (2) Programme of Industrial Development, 1951-56, op.cit. p.26.

3. Looms. Though the cotton textile industry is the most important industry in India, there are only five firms in India producing looms. Of these, one is located at Ellichpur (District Amravati). The combined production capacity of these five units, on single-shift basis, is 6,640 looms per annum. Further expansion of this industry can only be visualised when the Bhilai steel plant goes into production. The production of steel gives rise to the chance of meeting the requirements of spinning-ring frames, spindles, fluted rollers, tin rollers and looms.

#### IV. Industries based on non-metallic minerals

1. Limestone. It is distributed widely in the districts of Jabalpur, Nagpur, Amravati, Chanda, Raipur-Durg region, Bilaspur and Yeotmal.(1) But areas of importance are Katni in the Jabalpur district, the Chhattisgarh basin and round about Chanda. Its extensive use is not only confined to building and ceramic but is also a basic raw material for the metallurgical and chemical industries. Brown and Dey are of the opinion "that there is virtually no chemical process wherein lime is not used at some stage, either directly or in the manufacture of the reagents themselves."(2)

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(1) Brown, J.C. and Dey, A.K. - India's Mineral Wealth, 3rd Edn., Bombay 1955, pp. 329 and 330.

(2) Ibid., p. 324.

Limestone represents a group of calcareous rocks and limestone of different chemical properties are required for different industries. But "very little is, however, known of the physical properties which determine whether or not a limestone and its lime would suit a specific purpose in the chemical or metallurgical industry."(1) Recently (1957), the National Chemical Laboratory at Poona has taken "a survey of high grade limestone deposits in terms of their physical and chemical properties."(2)

There are very many industries that can be set up in the State and for which limestone as raw material is available in large quantity. It may be interesting to note that in tonnage consumption limestone is second only to sulphuric acid in industrially advanced countries. But in M.P. the only industry in which there is large-scale consumption of limestone is cement. Most of limestone quarried is exported and only a fraction is utilised within the State by cement works.

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- (1) Indian Trade Journal, Vol. 200 No. 13 June 29, 1957, Calcutta, p. 952.  
 (2) The Eastern Economist, Vol. XXVIII No. 26, June 28, 1957, New Delhi, p. 966.



A. Cement (Fig. 86). It is one of the few industries in India which grew up in the inter-war period without any fiscal protection and is also one of the well-established industries of India. Till 1950, there were 2 works of Associated Cement Company Limited located at Mehgaon and Kymore (both in the Jabalpur district).(1) The factory at Mehgaon is a small one, as the average number of workers employed daily in 1950 was only 83 while the Kymore works employed 2,412. In 1951 another Company came into operation at Kymore. In this works the number of workers employed daily in 1951 was 2,199. In 1954, the cement production in this State was 369,785 tons.(2)

The principal raw materials required in the manufacture of cement are limestone, clay and gypsum. Limestone is widely distributed in this State as mentioned earlier. China clay is found in Jabalpur, Chhindwara and Durg districts.(3) Madhya Pradesh has to import gypsum from the neighbouring State of Rajasthan, which contributed about 52.5<sup>p.c.</sup> of the all-India output of gypsum during the decade ending 1943.(4)

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- (1) Large Industrial Establishments in India 1950 and 1951, op. cit., Append. p. 47.  
 (2) The Times of India Directory and Year Book, 1956-57, Bombay, p. 646.  
 (3) Brown and Dey, op. cit., p. 377.  
 (4) Ibid., p. 358.

In the cement industry the cost of transport is a very important factor. Somani, after making due calculations, came to the conclusion that "the total element of railway freight paid on every ton of cement may come as high as 30 to 40%, from which we can very well appreciate how much the industry depends upon the Railway Rates Policy. Railway freight has considerably gone up in the last few years, thereby adversely affecting the cost of production of the industry."(1)

The second item which increases the cost of production is jute bags for packing cement, it "being over 15 per cent of the price of cement today."(2) Efforts should be made by the Government to find out substitutes for jute bags, such as paper bags.

Over and above this, with effect from the 16th May 1957, the excise duty on cement has been increased from Rs5 (Sh.7½) per ton to Rs20 (Sh.30) per ton. Reciprocally, the Government of India "have increased with immediate effect the selling prices of cement of all types by an equal amount in each case."(3) At a time when India wants to have economic

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- (1) Somani, B.D. - The Cement Industry - Conditions for Expansion and Stabilisation, Major Industries of India Annual, Vol. 3. 1953-54, Bombay, p. 159.
  - (2) Hattiangadi, Dr. R.R. - India's Cement Industry - Its bright future, Major Industries of India Annual Vol. 5 1955-56, Bombay, p. 131.
  - (3) Indian Trade Journal, Vol. 200, No. 8 May 25, 1957, Calcutta, p. 537.

development, this increase does not seem a sound proposal. The schemes and programmes in the public sector may not be affected but certainly the private sector will be hit badly. Besides its repercussion on the development of the industries in the private sector, the housing problem, which is already acute, will become acuter.

The present all-India production of cement is short of internal demand, but is increasing rapidly. There are two ways to increase production in this State, either to increase the capacity of the present works or set up new factories at some other suitable places within the State. There might well be a policy of decentralisation which will minimise the transport cost. Two new factories can be set up, one at Rajur, near Wun (District Yeotmal) and the other somewhere in the Raipur-Bilaspur area. The exact location can be decided after careful survey of the raw material in the Raipur-Bilaspur area. The raw materials, limestone, clay and coal, are available near at hand. As far as power is concerned it can come from the Central or Eastern Power Station. The Rajur factory will be favourably located in respect of consuming markets. The Kymore factory is 519 miles to the north and Shahabad's (District Gulberga) 397 miles in the south. The Raipur-Bilaspur factory will have coal from

- (2) Ibid., pp. 304-306.  
 (3) The Eastern Economist, Vol. XXVIII, No. 11, March 15, 1957, New Delhi, p. 377.

Korea (District Surguja) till such time when the Bilaspur collieries go into full production. Its range of market will be up to the borders of Vizagapatam. The Chhattisgarh area is comparatively backward and this factory will give an impetus to the people of the area.

The installed capacity of cement in M.P. during the first plan period (1950-51 to 1955-56) remained the same, i.e., 350,000 tons per annum.(1) There was no expansion programme for this State during the first plan period. During the second plan period it is proposed to expand the capacity of the present units from 350,000 tons in 1955-56 to 588,000 tons in 1960-61 and to set up a factory at Durg with a capacity of 250,000 tons and another at Bilaspur with a capacity of 330,000 tons. The total rated capacity by 1960-61 for this State will become 1,168,000 tons.(2)

The Government of India has sanctioned recently (1957) 31 new factories to be set up in different parts of India with a total capacity of 5.6 million tons. Of the new factories to be established, three would be in this State.(3) Besides, the expansion of the capacity of several other factories has been sanctioned.

(1) Report of the

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(1) Programme of Industrial Development 1956-61, op. cit., p. 300.

(2) Ibid., pp. 304-306.

(3) The Eastern Economist, Vol. XXVIII, No. 11, March 15, 1957, New Delhi, p. 377.

B. Calcium Carbide and Cyanamide. Calcium carbide is an important base for the manufacture of ammonia and allied products, acetylene, cyanides, urea and ursecticides. It is also a raw material for gums and plastics. Another important product is calcium cyanamide which is made from carbide and which is used as a fertiliser in various parts of the world. According to the Report of the Geological Survey of India, there are a number of quarries "in the Katni (Jabalpur district) area producing limestone suitable for the manufacture of calcium carbide..."(1) The possibility of developing this industry in the Katni area is to be explored.

C. Asbestos<sup>Cement</sup>/(Fig. 86). There is one factory at Kymore (District Jabalpur) producing asbestos cement. The production in 1954 was 27,130 tons.(2) The raw materials required for the manufacture of asbestos cement are asbestos, cement and power. The present factory gets the cement and power from the neighbouring cement factory. The other raw material, asbestos,<sup>is</sup>/imported from Rhodesia. As mentioned when dealing with minerals, asbestos deposits are known from near Sagar,

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- (1) Report of the Provincial Industries Committee, 1945, op. cit., p. 32.  
 (2) The Times of India Directory and Year Book, 1956-57, op. cit., p. 646.

(1) Large Industries, op. cit., p. 320

(2) Brown and Jay, op. cit., p. 646

Sanoda and Bachai, but these are yet to be investigated in detail. It is suggested that there should be an intensive survey of the State to find out if the asbestos deposit is sufficient to meet the demand of the local industry.

2. Ceramics (Fig. 86). There are 8 pottery works in the State - 3 at Chanda, 4 at Jabalpur and 1 at Nagpur. The average number of workers employed daily in 1951 was 2,908.(1) These works mainly produce stoneware pipes and fittings, jars, acid resisting stonewear and refractories. Some of them also manufacture crockery, but of very inferior quality. The raw materials required for this industry are coal, clay, china clay, fire clay, felspar, flint and silica. These are available in close proximity to one another in this State. Felspar is quarried at Lameta Ghat (District Jabalpur). The products of these quarries "are widely marketed in other parts of India, in both the processed and semi-processed condition."(2) Since 1941 at Borgaon and since 1948 at Lodhekhera, Chhindwara district, felspar quarries have been in operation.

With the completion of several big and small electric project during the first plan period and several under execution at present, the demand for porcelain and electric

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(1) Large Industrial Establishments in India 1950 and 1951, op. cit., p. 280.

(2) Brown and Dey, op. cit., p. 387.



ware has increased tremendously. The extension of telephone and telegraph also created a steady demand for insulators. Hence, it is advisable to set up a factory of porcelain and insulator in this State. The factory should be equipped with gas-fired tunnel kilns and should manufacture porcelain and electric ware. As a side enterprise the factory could also manufacture porcelain ware. Besides these, the factory could also take up some other miscellaneous items, for example, steatite insulators. Other articles that the new factory could manufacture are sanitary tiles and fittings, acid jars and other stoneware. The proximity of coal to clay and other raw materials, would ensure the low cost of production. All these products would find ready markets not only within the State but also in the neighbouring areas, where conditions for manufacturing these articles are unfavourable. Power could be obtained from the local supply. The raw materials are available in Chanda, Nagpur and Jabalpur. The exact location could be determined after a detailed survey of raw material. Despite "widespread occurrences of raw materials the ceramic industries in India suffer from a great handicap because of lack of sufficient and accurate knowledge of the quality and physical and chemical properties of the raw materials available from different sources."(1)

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(1) Report of the Panel on Refractories and Ceramics, Allahabad 1948, p. 41.

3. Refractories. (Fig. 86). The raw materials required for this industry are fireclay, bauxite, silica, coal and power. All the raw materials, except coal, are available near enough in the Katni area. Coal is also not far away. Power can be obtained from the local supply. In April 1956, there were 5 factories with an annual installed capacity of 37,600 tons in the State. During the second plan period, the Planning Commission has recommended the increase in capacity of three units in the Jabalpur district which have a total additional capacity of 39,800 tons and for 3 new schemes with a total capacity of 60,000 tons.(1)

For the Bhilai steel plant, the constructional demand of refractories would be 131,668 tons and recurring demand (operational), 52,500 tons. Besides this, the demand of refractories will be for glass, ceramics, refractories, cement, railways, etc. Thus there will be an expanding demand and it will not be very long when further expansion will become necessary.

4. Glass (Fig. 86). The manufacture of glass in India on modern lines began in the ninety's of the last century

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(1) Programme of Industrial Development, 1956-61, op. cit., p. 315.

at Jhelum (west Punjab) with the help of a German expert. This venture failed within a few years. The first impetus was given with the outbreak of the world war I. With best efforts, India could not meet her internal demands(1) The major expansion in the industry took place after 1939 when automation and semi-automatic machines were introduced largely in place of mouth blowing method.(2) At present the main products are bottles, vials, table and pressed ware, lampware, chemical glassware, glass shells for electric lamps, sheet glass, thermos flasks and miscellaneous glassware. Besides production by factories, it is also cottage industry, producing bangles and beads mainly. In 1938, there were 4 factories in this State.(3) By 1951, the number increased to 5 and the average number of workers employed daily was 1,160.(4) Bhandara, Chanda and Jabalpur have one factory each and Nagpur two. The annual rated capacity of these factories is 4,220 tons.(5) Since

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- (1) Report of the Panel on Glass Industry, Lahore n.d., p. 3.  
 (2) Shah, Manubhai - Progress of Glass Industry: New Lines of Production undertaken, Journal of Industry and Trade, Vol. VII No. 5, May 1957, New Delhi, p. 663.  
 (3) The Commercial and General Directory of C.P. and Berar, 1938, Khandwa, p. 380.  
 (4) Large Industrial Establishments in India 1950 and 1951, op. cit., p. 277.  
 (5) The Times of India Directory and Year Book 1956-57, op. cit., p. 176.

1945, there has been considerable expansion in some of these factories and now have gas fired furnaces of latest design, resulting into fuel economy and operating efficiency.(1)

The raw materials required for this industry are sand, soda ash and lime. The factory at Jabalpur gets its sand from a deposit at site, the Bhandara works from Jabalpur and the other three from Uttar Pradesh. Besides Jabalpur, the only other place known in this State where pure enough <sup>are</sup> sands found is in Damoh (District Sagar) "but which still await detailed investigation." (2) The Jabalpur sand has to be washed before being used to remove Kaolin and other impurities. This State possesses excellent quality burnt lime in various parts. Soda ash, the most expensive of the raw material required for this industry, is imported. In glass manufacture, refractories for furnaces and pots are important. The Jabalpur fire-clays are excellent refractories for the purpose. Another important item is fuel. Coals of this State is generally of inferior grade but has "proved to be satisfactory for the production of gas..." (3) The conversion of the furnaces into gas-firing ones, would assist

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(1) Census of India, 1951, Vol. VII, Part I-A, op. cit., p. 356.

(2) Brown and Dey, op. cit., p. 430.

(3) The Provincial Industries Committee Report, 1945, op. cit., p. 34.

the industry. In Madhya Pradesh, however, one sulphuric

In connection with the location of the industry the Panel on Glass Industry says that "on account of the fragile and voluminous nature of the glassware, which does not easily bear haulage over long distances, nearness to the market is of greater determining influence as a locational factor than nearness to raw materials." (1) Hence, the primary consideration should be proximity to the market and not to the raw material. It is better to distribute the industry throughout the State as far as practicable. It may be mentioned here that the general tendency will be the establishment of small factories near the markets instead of large concerns near the raw material.

5. Chemicals. (Fig. 84) The importance of chemicals in the industrial development of a country cannot be over-emphasised. It is a key industry. It is used in the textile, leather, paper, glass, porcelain, rubber, artificial silk, paint and varnishes, soaps and candles industries and in the purification of mineral and vegetable oils. Not only does its importance lie in industries but also in agriculture in the form of fertilizers, insecticides, etc. But, unfortunately this State is poor in raw materials required for this industry. In 1945, this industry was practically

(3) Handbook of Indigenous Manufacturers of Chemical and

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(1) Report of the Panel on Glass Industry, op. cit., p. 28.

non-existent in Madhya Pradesh. However, one sulphuric acid plant at Kanhan (District Nagpur) and one at Katni (District Jabalpur) were under erection. The other chemicals produced were the recovery of a small quantity of soda ash in crude form from the Lonar Lake (District Buldana) and a small factory at Nagpur producing caustic soda from soda ash obtained by <sup>the</sup>lime causticising process.(1)

In 1951 there were 4 chemical works in the State - 3 in Nagpur and one in Jabalpur.(2) The Jabalpur works and one in Nagpur produce heavy chemicals while the remaining two Nagpur ones produce fine and pharmaceutical chemicals. The heavy chemicals produced in Nagpur are sulphuric acid, hydrochloric acid, nitric acid, besides alumina and sodium silicate.(3)

Sulphuric Acid. There is no known deposit of element sulphur in India. The Panel of Heavy Chemicals and Electro-Chemicals recommended "that immediate steps should be taken by Government to utilise the enormous quantities of gypsum available in the country for the manufacture of sulphuric acid and for conversion into sulphur."(4)

- (1) The Provincial Industries Committee Report, 1945, op. cit., p. 71.
- (2) Large Industrial Establishments in India 1950 and 1951, op. cit., pp 253 and 256 and App. p. 42.
- (3) Handbook of Indigenous Manufacturers of Chemical and Miscellaneous Stores (January 1, 1957), Delhi 1957, pp 22, 24, 28, 39 and 47.
- (4) Report of Heavy Chemicals and Electro-Chemical Industries Panels, Semla 1947, p. 5.



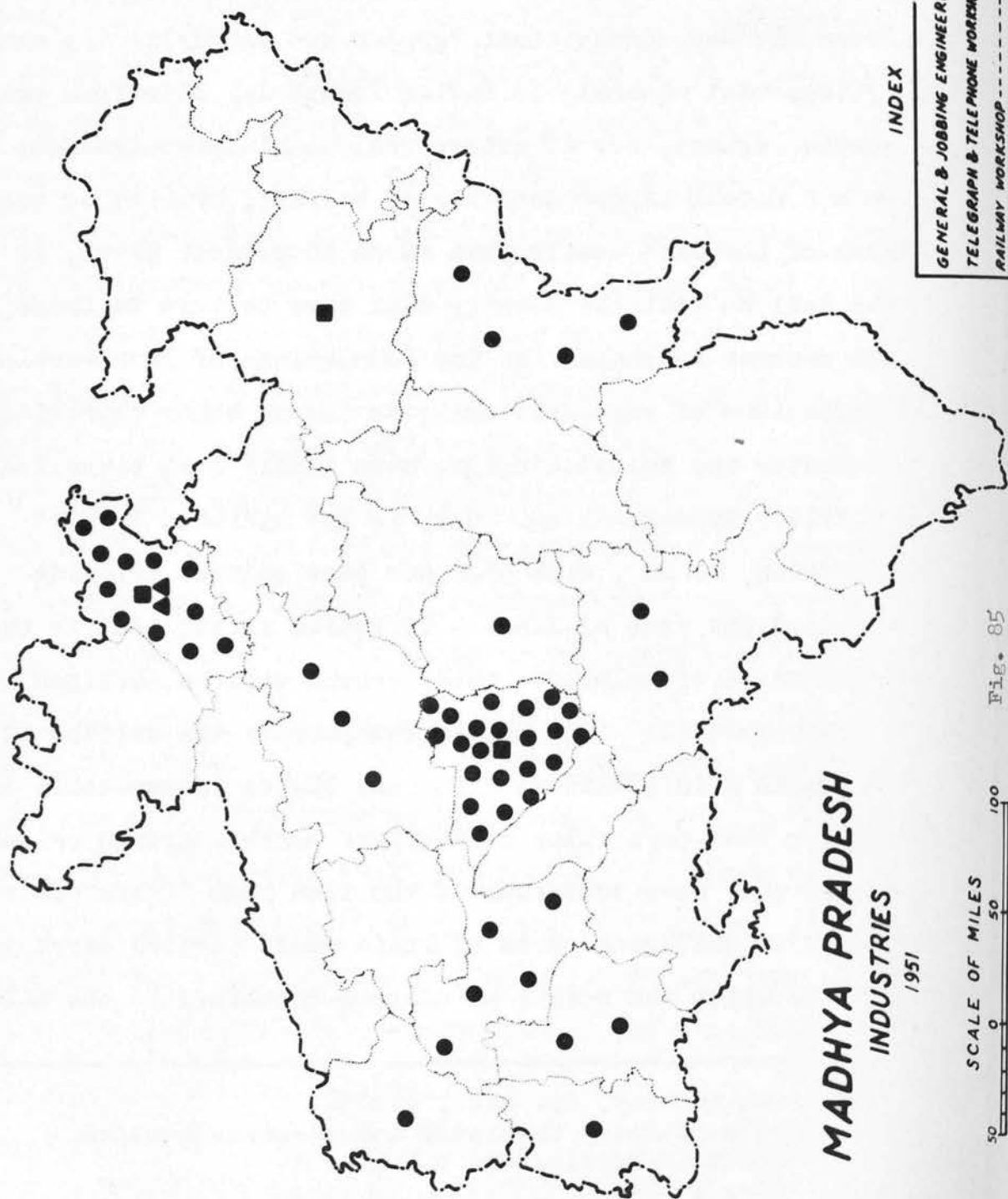
Brown and Dey comment that "gypsum and anhydrite are extremely important minerals in Indian industrial life from yet another aspect, for if future geological investigations do not reveal larger deposits of sulphur, pyrites or sulphide ores of the base metals than those at present known, it may well be that the country will have to turn to these two natural sulphates for the foundations of large-scale manufacture of sulphuric acid, as indeed other countries, including the United Kingdom, have lately been compelled to do."(1) Gypsum,  $\text{Ca So. } 2\text{H } 0$ , is the hydrated form of anhydrite,  $\text{Ca So}$ , with  $58.8^{\frac{4}{2}}$  per cent sulphur trioxide and  $41.2^{\frac{4}{2}}$  per cent of lime. If gypsum is utilised in the manufacture of sulphuric acid, cement will be obtained as a by-product.(2) The Panels recommended the setting of sulphuric acid plants in different States irrespective of whether that particular State might possess gypsum or not, though they were conscious of the fact that "Transport of gypsum to different parts of India would involve carriage of five times the weight of sulphur contained in the mineral!"(3)

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(1) Brown and Dey, op. cit., p. 358.

(2) Report of Heavy Chemicals and Electro-Chemical Industries Panels, op. cit., p. 5.

(3) Ibid., p. 5.



# **MADHYA PRADESH** **INDUSTRIES** / 95/

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- ▲ TELEGRAPH & TELEPHONE WORKSHOPS
- RAILWAY WORKSHOP

SCALE OF MILES  
50 0 50 100

Fig. 85

Of the 4 plants recommended by the Panels, one of 3,000 tons was to be located in this State. Further, the Panels said that this would not take into consideration of the demand for steel plant when installed.(1)

In June 1952, Madhya Pradesh had only one unit with a rated annual capacity of 825 tons. It was producing by the chamber process.(2) Its capacity was increased to 1,650 tons by April 1, 1956.(3) Under the second plan a firm at Nagpur has been granted licence to have an annual capacity of 16,500 tons.(4)

In view of the absence of "this raw material (element sulphur), the National Industrial Development Corporation is examining a scheme for the establishment of a plant based on the Orkala process for the manufacture of sulphur from pyrites."(5)

6. Matches. The first match factory in India was started by a Swedish enterprise in 1926 at Ambernath (near Bombay). According to the C.P. Directory there were 3

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- (1) Report of Heavy Chemicals and Electro-Chemical Industries Panels, op. cit., pp 6 and 7.
  - (2) Programme of Industrial Development, 1951-56, op. cit., p. 132.
  - (3) Programme of Industrial Development, 1956-61, op. cit., p. 186.
  - (4) Ibid., p. 189.
  - (5) Programme of Industrial Development, 1956-61, op. cit., p. 190.

factories (all in the Bilaspur district) which decreased to two in 1938.(1) The number of registered match factories in this State in 1951 was 3, one each at Bilaspur, Chanda and Nagpur. The average number of workers employed daily in two of them was 210,(2) But the industry is "finding increasing difficulty in securing an adequate supply of Semal wood."(3) All the three sectors, large scale, small scale and cottage, produce matches. The cottage and small scale sectors have to face another problem as they "are forced to pay high prices for raw materials which makes production uneconomic."(4)

The principal raw materials required for this industry are matchwood, potassium chlorate, phosphorus, sulphur, match paper and glue. Phosphorus and sulphur are entirely imported, matchwood and glue are supplied locally, while match paper and potassium are obtained from both sources. As far as raw materials are concerned, "the present position is far from satisfactory since supplies of soft woods, more particularly semal wood (*Bombax Malabaricum*), are fast being depleted. The industry is decidedly short of this raw material and planned efforts are necessary to raise

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- (1) The Commercial and General Directory of C.P. and Berar, 1938, Khandwa n.d., p. 380.
  - (2) Large Industrial Establishments in India 1950 and 1951, op. cit., p.
  - (3) Census of India, 1951, vol VII, Part I-A, op.cit p. 357.
  - (4) Programme of Industrial Development, 1951-56, op.cit., p.238.

plantation of matchwood species." (1) In compliance with the recommendation made under the first plan, this State, as well as some other States, has taken up the scheme of planting soft wood in the State.

There is no programme of expansion of match factories in either of the two plans for this State. But there is some programme for cottage match factories under the auspices of the Central Social Welfare Board and the All India Khadi and Village Industries Board. The Central Social Welfare Board had decided upon the establishment of one cottage match factory in Nagpur. (2) The All-India Khadi and Village Industries Board decided to set up 3,000 match making factories of cottage scale during the second plan period. But the village and Small Scale Industries (Second Five Year Plan) Committee is of the opinion "that in view of the initial difficulties of organisation, etc., a somewhat lower target of 2,000 factories may be kept in view." (3) The Report does not give the State-wise allocation of these factories as it "will have to be calculated when the production programme is more fully worked out." (4)

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- (1) Programme of Industrial Development, 1951-56, op.cit., P.238
  - (2) Programme of Industrial Development, 1956-61, op.cit. P.385
  - (3) The Village and Small Scale Industries (Second Five Year Plan) Committee Report, op.cit., P.59
  - (4) Ibid, p.59.

7. Paints and Varnishes (Fig. 84). Though India has important raw materials required for paints and varnishes industry, still she has to import about two dozens of materials.(1) The first modern factory of paints and varnishes in India was started in 1902 near Calcutta. The progress is satisfactory and now India produces a variety of products and also in such a volume "that it is now in a position to meet domestic requirements fully in almost the entire range and has a surplus productive capacity."(2)

Despite the State being rich in raw materials required for this industry, no paints and varnishes were produced in Madhya Pradesh till 1945.(3) Madhya Pradesh possesses large quantities of shellac, resins and vegetable oils, etc. It is also rich in certain pigments, especially red and yellow ochre, barytes and titanium oxide, which can be obtained as a by-product of making alumina. This State can also produce glycerine, formaldehyde, methanol, acetone, etc. From the above it is clear that if properly planned this industry could be developed in the State on modern lines.

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(1) Programme of Industrial Development, 1956-61, op. cit., p. 260.

(2) Ibid, p.157.

(3) The Provincial Industries Committee Report, 1945, op.cit., p.47.

(4) Programme of Industrial Development, 1956-61, op. cit., p.259.



But In 1951, there were 4 factories in M.P.; 3 in Jabalpur and 1 in Nagpur. (1) The main problem of the industry has been that the manufacturers of the standard paint "find it difficult to compete with mushroom factories producing cheap substitutes of inferior quality." (2)

Another problem is the shortage of containers due to the non-availability of tinplate and steel. (3) A factory at Kamptee, Nagpur, went into full production in 1952, and now manufactures ordinary ready-mixed paints. It is a joint enterprise of the Gondwana Paints and Minerals Co. and the Madhya Pradesh Government. (4)

During the second plan period no further expansion of the capacity has been recommended. The Planning Commission suggests that if the consumption of paints and varnishes increases during the second plan period, it can be met by work on double shift or by expanding the capacity of some of the present units. (5)

8. Soaps (Fig. 84). This is another industry which developed during the inter-war years without protection.

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- (1) Large Industrial Establishments in India, 1950 and 1951, op. cit., p.261 and App. p.43.
  - (2) Programme of Industrial Development, 1951-56, op.cit., p. 159.
  - (3) Ibid, p.159.
  - (4) Ibid, p.160.
  - (5) Programme of Industrial Development, 1959-61, op.cit., p.259.

(2) Programme of Industrial Development 1956-61, op.cit., p. 162.

But the real fillip came, as in almost all industries, during the last war. Soap is produced in India by all the three industrial sectors - large-scale, small-scale, and cottage production. The large scale factories are, too a great extent, concentrated in and around Calcutta and Bombay, while cottage scale is scattered all over India.

In 1951, there were 3 large units in this State, all in Raipur. (1) On January 1st, 1956, there were 5 large scale units with an annual capacity of 2,780 tons and 13 cottage scale units with 3,750 tons on the register of the Industries (Development and Regulation) Act, 1951. The statistics of units and capacity of small-scale and cottage scale units is difficult to ascertain. (2)

The large-scale factories produce full-boiled, settled washing soaps and milled toilet soaps, the small-scale units semi-boiled or cold process, and cottage units filled cold process with obsolete techniques and low grade soap.

The principal raw materials required in the manufacture of soap are vegetable oil, fats and caustic soda. For the better type of soap, a small quantity of essential oils and aromatic, rosin and soap colour are required. Washing and inferior type of soap consumes sodium silicate and some other

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- (1) Large Industrial Establishments in India 1950 and 1951, op. cit., p. 263 and App. p.43.  
 (2) Programme of Industrial Development 1956-61, op.cit., p. 262.

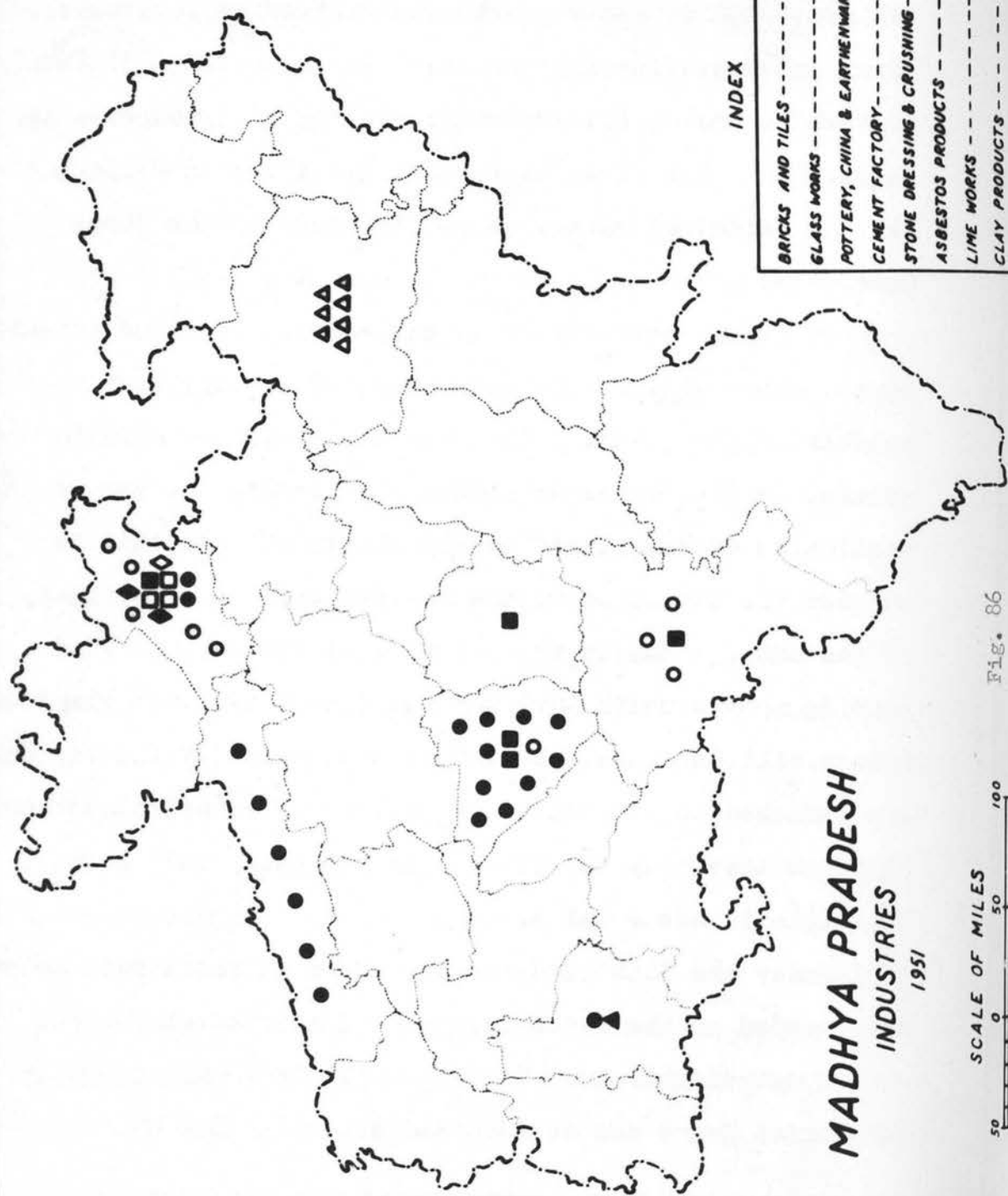
fillers, such as sodium carbonate, trisodium phosphate, borax and bentonite-like clays. In essential oil, Madhya Pradesh is one of the important centres of production in India.(1) This State is favourably placed in respect of all the principal materials and for most of the other materials.

If a soap industry is developed on proper and scientific line, there will be the production of an important by-product of glycerine. Thus the State will be able to develop another valuable industry. In the absence of statistics of demand and supply, it is not possible to suggest the expansion of the present units or setting up of new ones. But if the State finds the necessity of setting up new units they may be located all over the State. But it will decrease the cost of production if the big units are attached to oil mills and refineries or hydrogenation plant so that they may be able to get cheap soap stocks, available in these units.

Under the both plans no new units in India have been recommended as the rated capacity is sufficient for the rising demand till 1960-61. The All India Khadi and Village Industries Board has decided to establish 600 oil-cum-soap

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(1) Indian Trade and Industry, vol. VII No. 14. July 22, 1955, London, p.269.



production centres in the villages all over India to produce about 17,000 tons of soap per annum by 1960-61. These centres will utilise non-edible oils in the manufacture of soaps.(1)

9. Fertilizers. There is no chemical fertilizer plant located in M.P. There are only 2 small artificial manure plants, one at Khumani (District Durg) and another at Kamptee (District Nagpur), producing bone meals. Out of three chemical fertilizers, potassic, nitrogenous and phosphoric, potassic fertilizer cannot be manufactured in M.P. Potassic fertilizer can be produced in 3 ways, from potassium nitrate, from molasses or as a by-product of salt-manufacture. M.P. possesses none of these. The other two types can be produced.

The Government of India constituted a Fertilizer Production Committee on the 29th of October 1954, and its deliberations were published in 1956. The M.P. Government claimed that a fertilizer production unit should be set up in the neighbourhood of Itarsi (Railway junction in Hoshangabad district) and it is an advantageous position. This State claimed "that the nearby coal deposits in the Kanhan-Pench-Tawa valleys are nearest the Gypsum deposits

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(1) Programme of Industrial Development, 1956-61, op. cit., p. 264.

in Rajasthan and Saurashtra"(1). The Committee is of the opinion that gypsum can be imported from Kavas in Jodpur and Jamsar in Bikaner. The distances between Kavas and Itarsi and Jamsar and Itarsi are 700 and 800 miles, respectively. But as compared to the distance of 1,125 and 1,050 miles, respectively, between Sindri (Bihar) and Kavas and Jamsar, Itarsi is more favourably placed. The Tarwa Project, when completed, will supply water and electricity. Being centrally situated, Itarsi will be an ideal site from the distributional point of view. The M.P. Government is intending to produce soft coke. When this goes into production, any scheme of the expansion of fertilizer factory will be greatly helped by the availability of gas from the soft coke plant. The M.P. Government gave an undertaking to synchronise the soft coke scheme with the fertilizer scheme, if a decision is taken in favour of locating a fertilizer plant in Itarsi (2). The railway authorities have suggested another site. It is near Akola where the railway line cuts the broad gauge with the new meter gauge. It may be ideal from the transportation point of view as there will be no break-of-gauge transshipment. But the Committee did not agree with this proposal as "compared with Itarsi, Akola will have to reckon with an extra distance of about 40 miles in regard to gypsum and 135 miles in regard

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Vol. I, Delhi

(1) Report of the Fertilizer Production Committee-1956, p.59.  
 (2) Ibid. p.61



to coal"(1). Considering all the factors, the Committee came to the conclusion that out of the four most promising locations in India, one is Itarsi (2). Further it recommended that the plant capacity in terms of tons of end products per annum of Itarsi should be 250,000 tons of double salt (3).

A. Nitrogenous Fertilizers. The manufacture of ammonium sulphate consists of synthesis of ammonia and its conversion into ammonium sulphate. For synthesis of ammonia, hydrogen and nitrogen are required. If cheap power is available, electrolysis of water is adopted to get hydrogen. Ammonia is converted into ammonium sulphate either with the help of sulphuric acid or by gypsum. Ammonium sulphate is also obtained from coke ovens. Under the second plan, the Central Government has decided to expand the fertilizer industry further. Out of the 5 plants sanctioned for the second plan period, one is to be located at Bhilai Steel Plant. The joint annual capacity as fixed nitrogen of Bhilai Steel Plant (M.P.) and Durgapur Steel Plant (Orissa) will be 7,200 tons and ammonium sulphate produced will

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(1) Report of the Fertilizer Production Committee, Vol. I. Delhi, 1956, p.62.

(2) Ibid. p.79.

(3) Ibid. p.275.

be 35,500 tons.(1). This scheme will not require any great capital investment as it will be a by-product of the steel plant.

B. Phosphoric Fertilizers. In India, the principal raw material in the manufacture of super-phosphate is imported rock phosphate. In other countries it is bones. In countries where bone is utilized, valuable by-products, bone glue and ossein, are recovered before converting the residue into super-phosphate. Only through the development of subsidiary industries to recover bone glue and ossein, can bone be economically utilized for the manufacture of super-phosphate. If India wants large scale exploitation of bones for the super-phosphate manufacture, it should also, besides setting subsidiary industries, "organise proper collection of bones for enabling the entire quantity available to be profitably utilized". (2) During the first plan period, the Government of India granted a licence for the installation of a plant in Nagpur to produce 33,000 tons of super-phosphate per annum (3). It is expected to go into production in 1956-57. Under the second plan, no new licenses have been granted for this industry.

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- (1) Programme of Industrial Development, 1956-61, op.cit., p.178.  
 (2) Programme of Industrial Development, 1951-56, op.cit., p.124.  
 (3) Programme of Industrial Development, 1956-61, op.cit., p.183.

10. Coke Oven Plant. Hard coke is an important raw material used in iron and steel, ferro-manganese, calcium carbide, synthetic industries and in many others. When coal is carbonised, it gives valuable by-products, which constitute as the primary raw materials of a large number of basic industries, such as dyestuff, explosives, pharmaceuticals, plastics etc.

It is proposed to set up a coke oven plant for large-scale production of coke to meet the requirements of the Bhilai Steel Plant. The annual capacity (coal carbonised) of this plant will be about 1.66 million tons. In view of the fact that high grade coal in India is limited, it is proposed to wash the coal before it is used in coke oven plants for the production of coke in the steel plant. Under the second plan, it is proposed to establish a coal washery in the Bokaro-Kargoli area to treat its coal for the use in the Rourkela and Bhilai Steel Plants (1).

The production of coke, coal-tar and by-product ammonia-ammonium sulphate at the Bhilai plant, if full carbonisation capacity is utilised, is given below (2).

Coke.	1.286 million tons of which 1,018,000 tons of plus 40 mm. and above size.
Coal-tar	44,500 tons
Ammonium Sulphate or Ammonia.	16,300 tons

(1) Programme of Industrial Development, 1956-61, op.cit., p.213  
 (2) Ibid. p.214.

The by-products recovered from the Bhilai Steel Plant are given below (1).

Benzene                1.872 million gallons.

Toluene                437,000 gallons.

The tar distillation products will be creosote oil (heavy) 3,400 tons, tar distilled 45,000 tons, crude phenol 800 tons and naphthalene 1,700 tons.

By June, 1957, it was decided to set up the coal washery at Kargoli which will produce 550 tons of coal per hour. It will wash the entire annual output of about 2.2 million tons coal produced in the Bokaro and Kargoli Collieries. This production will be able to meet the major part of the coal requirements of the Bhilai and Rourkela Steel Plants (2). A sum of Rs.100 lakhs (£50,000) has been allotted for two coal washeries in the central budget for 1957-58 (3).

Conclusions. It cannot be over-emphasised the urgency and necessity of the economic development of this State. In the two five year plans, some projects, some of them very important, have been launched. But as compared to other States, like Bombay, Bengal and Madras, less attention has been paid. The Government of India accepted its importance

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(1) Programme of Industrial Development, 1956-61, op.cit., p.218.

(2) Indian Trade Journal, Vol.200 No.12. June, 22, 1957, Calcutta, p.854.

(3) Explanatory Memorandum on the Budget of the Central Government for 1957-58 op.cit., p.881.

when it said that "Development is a matter of great urgency and importance in the C.P. owing to its being one of the backward provinces with large potential resources. Its minerals have not been fully surveyed; but even in respect of known deposits, the province occupies a high position. The integration of the States (Indian) has increased its potential resources and correspondingly the importance of taking early action to utilise them to the greatest advantage."(1).

India is on the threshold of the economic development and exploitation of her resources. The knowledge of potential resources of minerals is incomplete and no complete geological survey has been made. The statistics are defective, incomplete and unreliable. Under the circumstance, it might be advisable for her to take a lesson from the United States. "The two world wars and unhibited business methods have hastened the exhaustion of the once abundant supplies of metal, and the United States is increasingly an importer. Copper resources, consumed at the present rate approaching 1 million tons per year, are estimated to last for 10 years; imports already furnish one-half of current consumption. Lead mines, once the largest in the world, now produce only 50% of their output of 20 years ago. Zinc resources have an estimated life of 19 years,

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(1) Provincial Development Programme, Government of India, New Delhi 1950, p.66.

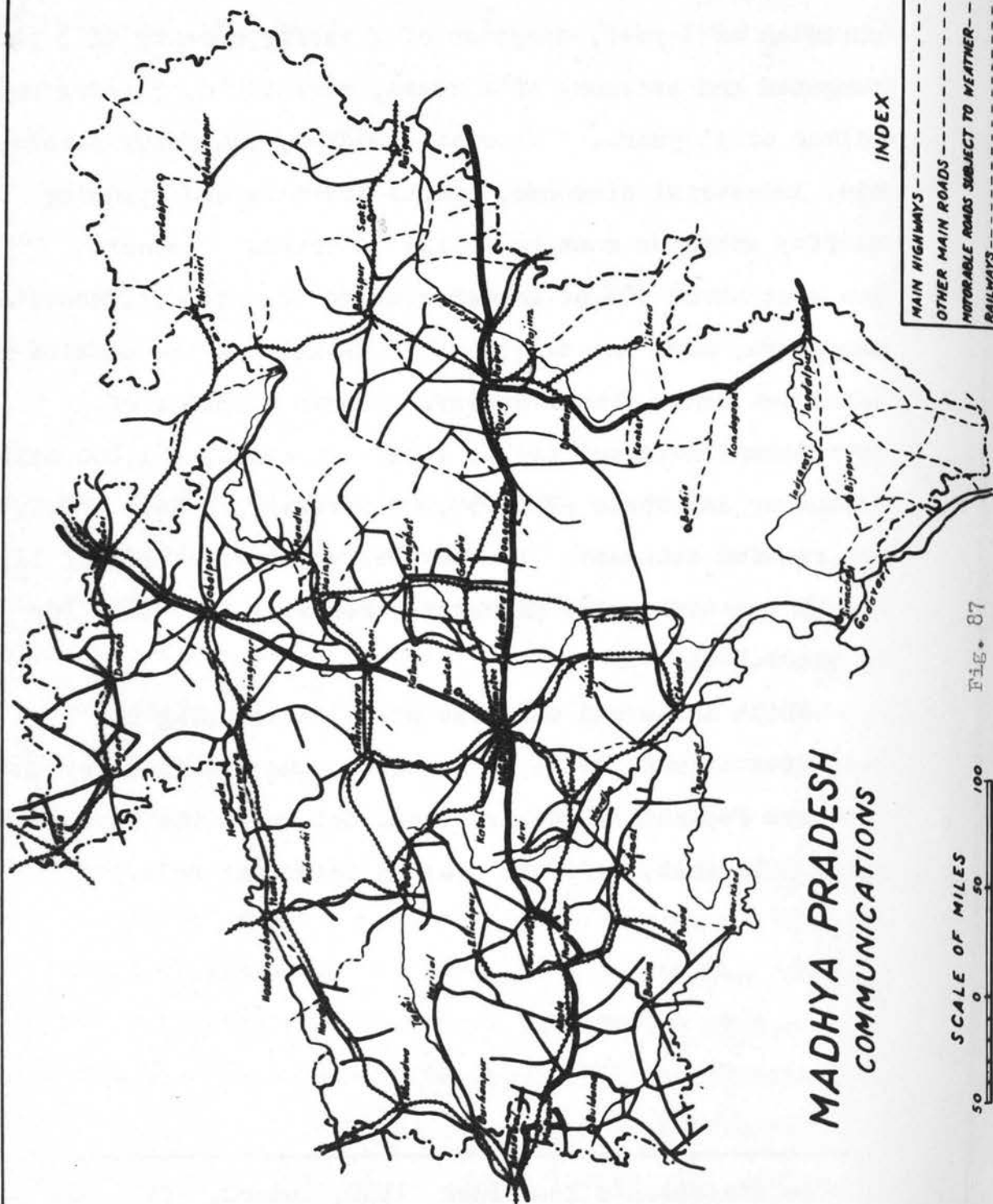
chromium of 1 year, manganese of 2 years, mercury of 3 years, tungsten and antimony of 4 years, vanadium of 7 years and silver of 11 years. Chromite, nickel, platinum metals, tin, industrial diamonds, quartz crystals and spinning quality asbestos must be wholly imported. Imports now meet about 30% of domestic needs in antimony, asbestos, manganese, mica and tungsten. One-half of the bauxite for aluminium comes from overseas. Known supplies of petroleum should suffice to 1964; currently 421,000 wells are producing in excess of 4,750,000 barrels per day. Only iron ore remains abundant; proved reserves have a life of 111 years, though the high grade Minnesota ores will last only for 17 years." (1)

While India can only advance by developing its resources it must do so in a planned and balanced way that will conserve replaceable resources and not waste the expendable ones. In this, M.P. can play an important role.

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(1) The Statesman's Year Book, 1950, London, 1950, p.575.





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- MAIN HIGHWAYS ———
- OTHER MAIN ROADS ———
- MOTORABLE ROADS SUBJECT TO WEATHER ———
- RAILWAYS ———

## MADHYA PRADESH COMMUNICATIONS

SCALE OF MILES  
0 50 100

Fig. 87

## Chapter X - Transport.

(Fig. 87)

In India of today all forms of transport, from the most primitive to the most modern, are found side by side. In the pre-British period roads and rivers were the main artillery of communication. During the British period inland waterways lost its importance and railways and air transport became important. The transport condition in India is far from satisfactory. It is said that America creates traffic, Britain meets traffic and according to Pant of the Lucknow University India frightens traffic! (1)

Roads. In ancient India there were roads and wheeled vehicles (2). The excavations made at Mohenjodaro in Sind and Harappa in the Punjab reveal the fact that from 3500 to 2500 B.C. these towns had broad streets and a drainage system (3). During the time of the reign of Chandra Gupta (322 B.C.) pillars indicated as mile stones and sign-posts were set up. Fa-Hein, the famous Chinese traveller, who

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(1) Pant, D. - Transport Problems of India, Bombay 1950.

(2) Report of the Indian Road Development Committee, 1927-28, Calcutta 1828, p.3.

(3) Kynnersley, T.R.S. - Roads for India, Bombay 1945, p.6.

visited India in the early 5th century A.D. gives the description of the resthouses provided on the highways. The roads had their due importance during the Pathan and Mughal periods. Ibn Batuta, who travelled in India in the 14th century, describing a journey in India says that "the road is lined with willow and other trees so that a traveller feels that he is in a garden throughout this distance" (1). Emperor Sher Shah's reign (1540-45) is famous for the construction of roads and they were well maintained. The present Grand Trunk Road from Calcutta to Peshawar is a super-structure on the same road which was constructed by Sher Shah. The Tarikh-I-Sher-Shahi (History of Sher Shah's reign) gives interesting descriptions of the roads, sarais (rest houses) and fruit-bearing trees planted on both sides of the highways. Another book of the 18th century, Chahar Gulshan, gives a list of 24 important roads which were the network of road communication during the Mughal period. It is said that "the present road system of India is a super-structure raised on the old Mughal and other roads"(2). In the beginning the East India Company was interested in the

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(1) Our Roads, Modern India Series No.11, Ministry of Information, Delhi 1948, p.19.

(2) Ibid, p.22.

roads of military importance only. Till 1854, when the Civil Department of Public Works was established, "the authority for construction of roads and building was vested in a Military Board in each Presidency" (1). Even after the creation of the Civil Department of Public Works, 'roads' was treated as a subject of local importance. Under the Government of India Act of 1919, roads became a provincial subject "and the Central Government ceased to concern itself with road development, except for roads of military importance and certain arterial roads in Indian States (Princely India)" (2). The provinces transferred it to local bodies. Thus roads became a subject of local importance. The local bodies had very limited resources, with the result that not only was further expansion checked but also the roads already in existence deteriorated. Another factor contributed to this state of affair. This was the advent of railways in India. All were company sponsored enterprises with government guaranteed interest. Hence, the government was interested in their prosperity. With this, the problem of rail - road competition arose. The Government of India's policy "was on a restriction

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(1) Mitra, T. - Presidential Address J.I.R.C., Vol XVII, Part 4, Feb 1953, New Delhi, p.505.

(2) Our Roads, Modern India Series No. 11, Ministry of Information, Delhi 1948, p.22.

of road transport wherever it seemed to compete for custom with the railways. Such a policy also affected indirectly the interests of road development in the country, as roads came to be looked upon by the railway interests (and therefore, in a way, by the Government of India) as a sort of equipment in the hands of an 'enemy' (1). The deteriorating conditions of roads resulted in the setting up of a committee by the Government of India under the chairmanship of Mr. M.R. Jayekar. The Report of the Indian Road Development Committee says that "with the advent of railways, attention was concentrated on the construction of feeder roads at right angles to them, and the trunk roads, especially where parallel to the railways, were in some cases allowed to go out of repair. There was a great increase in metalled feeder roads and roads of local importance" (2). The committee observed that the road development was beyond the financial capacity of the Provincial Governments and advised that the Centre should take up this matter of national importance. Among the recommendations of the committee the most important were the creation of a Central Road Fund to be financed by imposing a duty on motor spirit,

(1) Report of the Indian Road Development Committee.

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(1) Mitra, T. - Presidential Address, J.I.R.C., Vol XVII, Part 4, Feb 1953, New Delhi, p.506.

(2) Report of the Indian Road Development Committee, Calcutta 1928, p.9.

the setting up of a Standing Committee of the Central Legislature, and the coordination of road development by a central Road Board to be appointed by the Government of India (1).

According to the recommendation of the committee the Central Road Fund was created in 1929. Allocation of the fund to the provinces was to be made "according to the consumption of petrol in each administrative unit" (2). Madhya Pradesh, being less economically developed and having less consumption of petrol, got less to develop her roads. In spite of the thirties worldwide economic depression, on the whole, some appreciable improvement was made which continued till 1939.

In 1934, the Central Government set up a semi-official organization, known as the Indian Road Congress. The World War II, especially the Japanese offensive, brought home how inadequate was the transport to meet war requirements. In December 1943, on the recommendation of the Indian Roads Congress, the Government of India convened a conference of Chief Engineers of various states at Nagpur "to consider ways and means of planning future road development" (3). It is popularly known as Nagpur

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- (1) Report of the Indian Road Development Committee, Calcutta 1928, pp.53-56.
  - (2) Our Roads, Modern India Series No. 11, Ministry of Information, Delhi 1948, p.23.
  - (3) Postwar Road Development in India, Second Reprint, Delhi 1951, p.1.



Plan. According to this Plan, the roads are to be divided into 4 classes, i.e., National Highways, State Highways, District Roads (Major and Minor) and Village Roads (1).

1. National Highways will "be of national importance for strategic, administrative and other purposes" (2). This will include "Trails" to develop and open up large tracts without communication. The National Highways and Trails will be the responsibility of the Centre financially for development, construction and maintenance.

2. State Highways will "be the main arteries of commerce by road with a province or similar geographical unit" (3).

3. District Roads will be of 2 types - Major District Roads and Minor District Roads - according to their importance. Major District Roads will be of superior quality and "will connect areas of production and markets with either a highway or a railway" (4).

4. Village Roads will be "essentially farm tracks" (5). The

(1) Postwar Road Development in India, Second Reprint, Delhi 1951, p. 28.

(2) Ibid, p.28.

(3) Ibid, p.6.

(4) Our Roads, Modern India Series No. 11, Ministry of Information, Delhi 1948, p.27.

(5) Postwar Road Development in India, Second Reprint, Delhi 1951, p.28.

main object of Village and Minor District Roads will be to meet the requirements of rural population.

The recommendations made in the Nagpur Plan were accepted by the Government of India and the Central Government took over the financial and executive liabilities in connection with the National Highways with effect from the 1st of April, 1947.

Commenting on the scheme of National Highways, Sharma says that it "does not fit in with our future plan of decentralization and regional distribution of industries" (1). Sharma is right when he says that "from the point of view of the future industrialization of the country they (National Highways) will only improve further the transport relations of cities like Bombay, Calcutta and Ahmedabad, already well provided with transport facilities at the cost of other towns and cities and further aggravate the excessive concentration of industries in these cities and the surrounding regions" (2).

As far as the development of roads in India is concerned it "has been and still is most inadequate" (3). Even if the

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(1) Sharma, Tulsi Ram, - Location of Industries in India, 2nd Edn., Bombay 1948, p.191.

(2) Ibid, p.191.

(3) Spate, O.H.K. - India & Pakistan, London 1954, p.316.

target for roads development set in the First Five Year Plan is achieved it "is insufficient for her needs" (1).

Roads in Madhya Pradesh. In 1861 Central Provinces (less Berar) was formed as a Province. At that time "there was not one road completely built though there were many under construction" (2). During the period 1862-63 to 1902-03, there was a good amount of construction and improvement of roads and bridges. In 1902 Berar with a total mileage of 1802 of roads was annexed to the Province. Before the introduction of railway in Berar, the main line of communication was the old Nagpur 'dak' road traversing from southwest to northeast. Now the main line of communication is the railway which traverses from east to west, "with a system of feeder-roads running north and south from it" (3). Between 1891 and 1903, only 5 miles were added to the total mileage of provincial roads of Berar. In 1891, it was 857 miles and in 1903, 862 miles (4). In M.P., before the construction of railways there were several main trunk roads connecting various districts of the State and

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- (1) India: A Reference Annual 1956, Ministry of Information & Broadcasting, Delhi 1956, p.248.
  - (2) Gupta, H.R. - Road Development in M.P. - Transport-Communications Monthly Review, No.105, Jan.1956, Delhi, p.3.
  - (3) Imperial Gazetteer of India, Provincial Series, Berar, Calcutta 1909, p.39.
  - (4) Ibid, p.39.

also the adjacent States. But "the construction of the railways has entirely removed the importance of the old trunk routes, except along certain lengths where they serve as feeders" (1). Between 1892 and 1905 there was a remarkable development of roads in M.P. The total was 2,669 miles (536 miles of metalled road and 2,133 embanked roads) in 1892 and 4,613 miles in 1904 (1,646 miles metalled roads and 2,967 embanked) (2). The progress of road development in the present century can be gauged from the table given below.

Table No. 77 Showing the length of roads in Madhya Pradesh.

<u>Year</u>	<u>Total length (in miles)</u>
1902-03	7,111 (3)
1935-36	9,682 (3)
1949-50	12,012 (4)
1952-53	13,254 (5)

Although the progress made during the last 50 years in M.P. is not inconsiderable, the general development of the State "has been greatly hindered for want of adequate means of communication" (6). As compared to other States of India the

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- (1) Imperial Gazetteer of India, Provincial Series, Central Provinces, Calcutta 1908, p.68.  
 (2) Ibid, p.68.  
 (3) Gupta, op. cit., pp. 3 and 4.  
 (4) Basic Road Statistics of India, Ministry of Transport, Delhi 1954, p.20.  
 (5) Times of India Directory and Year Book, 1955-56, Bombay, p.696.  
 (6) Gupta, op. cit., p.4.

cost of maintenance is low in Madhya Pradesh as the State is rich in road material and cheap labour.

Table No. 78 Showing the cost of maintenance of roads per mile in some of the States of India. (1)

<u>State</u>	<u>Maintenance cost per mile</u>	
	<u>Metalled</u>	<u>Un-metalled</u>
	Rs	Rs
Bengal	1,644	309
Punjab	1,055	216
Uttar Pradesh	757	248
Bihar	716	625
Bombay	469	316
Central Provinces (M.P.)	426	158

The National Highways which pass through the state are:

1. National Highway No. 6. Bombay - Calcutta road
2. " " No. 7. Banaras - Cape Comorin road
3. " " No. 26. Jhansi - Sagar - Lakhnadon road
4. " " No. 43. Raipur - Vizianagram road.

The total length of the National Highways within the State is 1,164 miles. Under the First Five Year Plan 90 miles of missing links is to be constructed and 808 miles to be improved. Two important bridges - Gandhi Bridge on National Highway No. 6 and the Dudh Bridge on No. 43 have already been completed. (2)

Under the State Roads development plan there are

- 
- (1) Administrative Report of the Buildings & Roads Branch, Nagpur, 1942, p.1.  
 (2) Gupta, op. cit., p.4.

72 schemes. (1). According to the First Plan, 2,311 miles of State roads are to be constructed or improved during the Plan period. Some of the important schemes are:

1. Old Bombay Road. It is 131 miles long. When completed it will connect the northern districts of the State with Bombay on one side and Uttar Pradesh on the other. On March 16, 1956, the foundation stone of a bridge across the Betwa in the Jhansi District (U.P.) was laid by the Chief Minister of U.P. This bridge will be completed by June 1957(1). The old Bombay Road, when completed, will provide facilities to export the produce from the rich valley of the Narmada.

2. Rajim - Gariabund Road. This 28 miles long road will open up an under-developed area and help in its development. Rajim (Dt. Raipur) is a railway station.

3. Ratanpur - Katghora Road. It is only 32 miles long. But it will be of immense value to the Katghora tahsil (sub-division) of the Bilaspur district. This road will help in the exploitation of the minerals of the area and will also provide an outlet for the forest produce.

4. Saraipalli - Raigarh Road. This is inter-district

(1) India News, High Commission, India House, London, March 31, 1956.

(1) India News, High Commission, India House, London, March 31, 1956.



road. The length of the road is  $14\frac{1}{2}$  miles. This will link Raigarh with National Highway No.6. At present Raigarh is not on any all-weather road. This road including bridges and culverts is near completion (1).

5. Dharamjaigarh - Kharsia. This 33 miles long road will connect Dharamjaigarh (Udaipur) with the railway station of Kharsia (Raigarh District). This will help in the exploitation of the forest and agricultural produce of the potentially rich but undeveloped Chhattisgarh Plain. The construction of 2 major bridges has been completed (2).

6. Dharamjaigarh - Raigarh Road. This road of  $23\frac{1}{2}$  miles long along with bridges has been completed. This road has opened a vast undeveloped area.

7. Pathalgaon - Jashpur Road. The length of this road is  $62\frac{1}{2}$  miles. It is part of the proposed main road from Raigarh to Jashpurnagar (previously of Jashpur State and now part of the Raigarh District). This will connect with the interior by all-weather road. All important bridges of Pathalgaon - Jashpur Road have been completed (3).

8. Dharamjaigarh - Pathalgaon - Ambikapur - Baikuntpur

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(1) Gupta, op. cit., p.5.

(2) Ibid, p.5.

(3) Ibid, p.5.

Road. This is an important scheme in view of the fact that the above places have no railway communication. It is 122½ miles long. It will connect the district headquarters of Raigarh and Ambikapur (Surguja District). This road will pass through a rich hilly area which is under-developed. The work on the road is in progress and all major bridges and 84 crossings have been completed (1).

From the Central Road Fund, the Penganga bridge on the Akola - Hingoli Road has been completed and another bridge on the Narmada on the ~~Khadwa~~ - Indore Road is under construction. From the same fund, the schemes to construct and improve 185 miles is being financed.

Another scheme has been launched by the State since the end of 1953. According to this scheme the public is to pay one-third of the cost in cash, or kind or both and the remaining by the State. In some of the districts of the State the response has been encouraging. Under this scheme 196 miles of roads are under execution.

Besides the above schemes, the State Government has placed Rs. 100,000 (£7,500) per district per year "at the disposal of Deputy Commissioners for the construction of

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(1) Gupta, op. cit., p.6.

(2) Ibid, p.6.

Village roads" (1). Under this scheme 148 miles have already been completed and 348 miles are under construction.

According to the Nagpur Plan, Madhya Pradesh needs 13,000 miles of metalled roads "to meet the basic needs of the State" (2). It is expected that out of this 13,000 miles 8,000 miles should be completed by the end of the First Plan and the remaining in the next plan. (3).

In 1945, the Nagpur Plan suggested that Madhya Pradesh should have a total of 23,500 miles of roads within 15 years time. In the same year a Development Plan of the State was prepared. Under the Provincial Road Plan the State "planned to undertake work to cost Rs. 7 crores (Rs. 70 million) during the first five years..." (4). The financial stringency did not permit this programme to materialize.

In 1947, a quinquennial programme of road development in Madhya Pradesh was prepared to connect 750 villages by means of 1,700 miles of village roads, to construct 840 miles of new roads and to improve 1,060 miles of old roads (5). But "on account of financial stringency, however, it could not be

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(1) Gupta, op. cit., p.6.

(2) Ibid, p.7.

(3) Ibid, p.7.

(4) Outline of the Development Plan of the C.P. & Berar, Nagpur 1945, p.76.

(5) Census of India, 1951, M.P., Vol.7, Part IA-Report, Nagpur 1953, p.211.

implemented to any appreciable extent" (1).

The First Five Year Plan has reduced the Nagpur targets, but with the provision to have "a steady, balanced and continuous" development of roads in India (2). In the First Five Year Plan priorities for the development programme of the National Highways were given to complete all works in progress and completion of missing links (3). It is hoped that at the end of the Second Plan "the target for road mileage proposed in the Nagpur Plan will be practically reached by 1960-61 (4). The target of roads mileage may be achieved by the end of the Second Plan but the target for bridges will take another plan to achieve (5).

It will be obvious that the emphasis on road development is on National Highways and State Highways. Village roads and forest roads have not been given great attention, and this is especially true of the comparatively less developed areas of the interior. Batra in his Presidential Address at the 18th Session of the Indian Roads Congress correctly observed that "it

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- (1) Census of India, 1951, M.P., Vol. 7, Part IA-Report, Nagpur 1953, p. 211.
  - (2) Bhatnagar, K.P. & others - Transport in Modern India, Revd. Edn., Kanpur 1953, p. 249.
  - (3) The First Five Year Plan, Planning Commission, Delhi 1953, p. 480.
  - (4) Second Five Year Plan, Planning Commission, Delhi 1956, p. 476.
  - (5) Mathrani, H.P. - Presidential Address, J.I.R.C., Vol 19, Part 4, June 1955, Delhi, p. 567.

is necessary to build new village roads first before our other economic plans could be put on wheels. Unless we criss-cross the whole country with village roads of at least minimum specifications, village communities will be a drag on our progress and will not be in a position to contribute their mite to the building up of the country's economy" (1). The main reason for this state of affair is that "the construction of rural roads to serve the villages of India is left to the local bodies who, ..., have no financial resources. The result is that the construction of rural roads which are essential not only for increasing the standard of living but also for bringing the urban and rural populations into closer contact lags behind" (2).

Rail - road coordination is another factor which is receiving immediate attention. In the beginning when the railway was constructed, roads were looked by the Central Government as a rival to railways and thus road development got set back. In 1933, the Government of India appointed a committee consisting of K.G. Mitchell, then Road Engineer with the Government of India and L.H. Kirkness, then officer

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(1) Batra, R.K., - Presidential Address, J.I.R.C., Vol 18, Part 4, Feb. 1954, Delhi, p.491.

(2) Nambrar, K.K. - Presidential Address, Transport-Communication Monthly Review, No. 106, Feb. 1956, Delhi, p.11.

on Special Duty with the Railway Board, to examine and recommend the problems relating to rail - road competition. They recommended that "the solution in many cases may lie in the railways themselves operating motor transport on parallel roads" (1).

In 1938, the National Planning Committee appointed a sub-committee on Transport Service which submitted its Report in 1940. It says that "the aim should be to plan a system of coordination which, while protecting and providing for the development of one form of transport should not be permitted to interfere with the national development of another equally useful form of transport. Coordination between the different means of transport should be based upon the fact that they are capable of being complementary to each other" (2). The Report further says that "roads are a Provincial subject but this conference stressed that Central direction and coordination was necessary for systematic development on an all-India basis" (3).

In constructing roads, the main consideration had been

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- (1) Mitchell, K.G., and Kirkness, L.H. - Report on Road and Railway Competition and Coordination, Calcutta 1933, p.75.  
(2) Transport, National Planning Committee, Bombay 1949, p.128.  
(3) Ibid, p.223.



that they should not be parallel to railways to avoid competition with them, as far as possible and practicable. Between the Vindhyan and Satpuras main roads are parallel to these ranges and the feeders are perpendicular. On the Vindhyan and the Satpuras mainly they are perpendicular. On the Maikala Range, the main road is parallel while the feeders are perpendicular to main roads. The direction of all the main roads is more or less east to west. On the plains the roads have radiated in all directions avoiding generally to be parallel to railways. Topography has helped in the average expansion of the transport system in the State - not so great expansion as in the Gangetic Plain and not so spare as in Sind. The greater expansion has taken place on the plains and the least on the plateau region of the State. Tropical climate with torrential rains has made it necessary to construct all-weather roads which are costlier. There are many unbridged roads and during rainy season, traffic crosses the rivers on ferry boats, which is a hindrance in economic development of the State. Black Cotton Soil is a great handicap as during summer it becomes very hard and cracks and during rainy sticky, creating problems of maintenance. Roads have helped agriculture in two ways. Internally they have helped the agriculturist to bring

the commodities to market and fair distribution all over the State. As feeders to railways they have supplied certain agricultural commodities to railway for export. This has resulted in the development and expansion of certain agricultural commodities. It has also helped the railways in changing the direction of trade movement. There had not been much effect on mineral exploitation.

The first impact of railway on road had been that old trunk routes lost their importance and mainly became railway feeders, except Nagpur - Jabalpur road (as there is no direct railway connection between these two cities). Railways also changed the direction of communication from the southwest to northeast to north and south in Berar.

Railways. It is to England that the credit goes for inaugurating the first train in the world. This was in 1825.<sup>(1)</sup> The first train with passengers and goods ran between Stockton and Darlington. <sup>(1)</sup>. India is the ninth country to have inaugurated its first train. England was followed by France in 1829, U.S.A. 1830, Germany 1835, Russia 1837, Holland and Italy 1839, Spain 1848 and India 1853. <sup>(2)</sup>. Only after 6 years of

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(1) Indian Railways One Hundred Years, 1853 to 1953, Ministry of Railways, Delhi 1953, p.6.

(2) Ibid, p.6.

the inauguration of a train in Britain, the idea of railroad was taken up in the Madras Presidency in 1831-32 and another in 1832 to connect Madras and Bangalore. But the above schemes did not materialize. It was in 1844-45 that construction work on a railway line took place in India for the first time. For one reason or other the operation of a train was delayed and the first train was run in 1853 by a private company, known as Great Indian Peninsula Railway. After the opening of the Great Indian Peninsula Railway in 1853, the beginning of the main railway system was taken up within a decade. (1) The policy for the construction of railways favoured "private enterprise with a guaranteed interest on capital outlay" (2). This policy of "private enterprise" was pursued till 1869. Later on "the failure of the guaranteed railways, the increased burden of the guarantee and the urgency of the railway extension forced the authorities to find a solution out of impasse, and the State construction of railway lines was considered to be the proper remedy" (3). In 1869, on the insistence of Lord Mayo, then Governor-General of India, the Duke of Argyll, then Secretary of State for India, "agreed with the policy of State con-

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(1) Bhatnagar, K.P. & others, op. cit., p.83.

(2) Ibid, p.87.

(3) Ibid, p.88.

struction of railways" (1). With this change of policy of State construction and State management of railways, many schemes of railway construction were taken up by the Government of India. Later in 1880, owing to financial stringency, this policy was reverted and the policy of company construction and company management was revived. The government decided "to leave the remunerative lines to private enterprise and to take up construction of the unremunerative lines itself" (2). Obviously it was not a sound economic policy and the Parliamentary Select Committee of 1884 "recommended that the State should be authorised to construct both types of railways but most of the lines should be self-supporting" (3). The great economic depression of 1930-39 had its own repercussions on the economy of the Indian railways. During that depression period no appreciable progress in the construction of new railway lines was made in India. Immediately after this there came the World War II. During the war period not only was there no development of the railway system but the total mileage was reduced so as to release the railway materials for the Middle East. This had been the worst period of the Indian Railway though

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(1) Bhatnagar, K.P. & others, op. cit., p.89.

(2) Ibid, p.92.

(3) Ibid, p.93.

"the war period was, however, one of financial prosperity for the Indian Railways" (1). But during the war period "wear and tear of the capital equipment increased tremendously. The work of repairs and maintenance was beyond the physical capacity of the railway workshops. Moreover, some of the railway workshops,...., were turned over to munitions production adding further to the difficulty of repairs" (2). Within 2 years of the cessation of the hostilities, on India becoming independent in 1947, the Indian Railways had to face the consequences of the Partition. The immediate effect of the Partition was the extraordinary strain on railways for mass migration of people from one State to the other. The Indian Railways had to face a deficit of Rs. 27.4 million within a short period of  $7\frac{1}{2}$  months from 15th of August, 1947, to 31st March, 1948 (3).

There are certain problems which need solution for the smooth and efficient operation of railways in India. One of them and the most important is the question of different gauges. There are 4 gauges for Indian railways. Broadgauge is 5 ft., 6 in., metre gauge 3 ft.  $3\frac{3}{8}$  in., and narrow gauge

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(1) Bhatnagar, op. cit., p. 120.

(2) Ibid, p.118.

(3) Ibid, p.123.

2 ft. 6 in. and 2 ft. In 1853, Lord Dalhousie, the then Governor-General of India "recommended that the gauge should be five feet six inches" (1). His recommendation was accepted and it is known as the broad gauge. Later in 1870 the economic necessities compelled Lord Mayo, the then Governor-General of India, to recommend "that some of the new branch and feeder lines should adopt a gauge of three feet and three-eighth inches" (2). It is known as metre gauge. It is the metre gauge which "afforded a much needed means of communication to poorly populated and backward districts, since it could be built more cheaply, mile for mile, than the broad gauge" (3). Still later the narrow gauges (2 ft. 6 in. and 2 ft.) were adopted for one reason or the other. The multiplicity of gauges has been a controversial question since the very beginning. Spate is right when he says that "Mixture of gauges impedes smooth working" (4). Bhatnagar says that "the multiplicity of gauges is a constant source of inconvenience and has proved an impediment in the way of the development of Indian trade and industries. It presents difficulties in handling the traffic and in the economic use of the rolling

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(1) Indian Railways One Hundred Years, 1853 to 1953, Ministry of Railways, Delhi 1953, p.71.

(2) Ibid, p.71.

(3) Ibid, p.71.

(4) Spate, op. cit., p.316.



stock" (1). In the near future it does not seem plausible to adopt a single uniform gauge for all the railway lines of India. But it is possible to have two main gauges instead of four as is evident from the table given below.

Table No. 79		Showing Track Mileage open and under construction on 31st March 1955 (2)		
Gauge	Track open on 31st March 1955	Under construction on 31st March 1955	Total	
Broad 5'6"	26,553.77	152.07	26,705.84	
Metre 3'3 $\frac{3}{8}$ "	18,725.08	336.76	19,061.84	
Narrow 2'6" and 2'	3,757.69	..	3,757.69	

It is easier to convert the narrow gauge as the first step to achieve the ultimate objective of having one uniform gauge for the whole system. But the question arises to which gauge it should be converted - broad or metre. For that purpose a technical committee of experts should be appointed by the Government of India to study the gauge problem from all its aspects and decide the best gauge suited to Indian condition. On the question of gauge Kunzru Committee in 1947 recommended "a small technical committee of senior officers should be set up in three years time to examine the gauge question generally and to make recommendations for gauge conversion with the object of reducing the number of transshipment

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(1) Bhatnagar, op. cit., p.83.

(2) Report by the Railway Board on Indian Railways for 1954-55, Vol II - Statistics, Simla, 1956, p.9.

points" (1).

Between the Vindhyan and the Satpuras, the railway runs parallel to them in eastwest direction. On the Vindhyan and the Satpuras it crosses at the elevation of 2,116 ft. and 2,500 ft. On the Maikala Range the Railway is first parallel then turns to north to cross at an elevation of 618 ft. In the Berar Plain the direction is east to west, then it turns to north to join Nagpur and from Nagpur it again turns to east to pass Chattisgarh Plain to terminate at Calcutta. Whatever railway concentration there is, is mainly in the Berar and Nagpur Plains. Owing to the stability of river courses, passing through rocky areas, the construction cost is less than that for crossing the Western Ghat. The cost on the plain area is cheaper. Towns are connected with cotton tract, forest produce area, grain producing area and coal mines. Railways have changed the trade direction. Prior to that, Berar cotton was brought to Mirzapur and then through the Ganga to Calcutta for export, or else it went by Burhanpur (Nimar District) to the Surat ports. After the advent of the railway, most trade went through Bombay or direct to Calcutta. The Central Railway passed either through or on

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(1) Report of the Indian Railway Enquiry Committee 1947 (Kunzru Committee), Delhi 1949, p.221.

the fringe of forests. This helped greatly in forest resources exploitation. The railway from Itarsi to Allahabad taps the forest produce at many places. The S.E. Railway passes through forests and coal - the area between Mandla and Jabalpur is forest area, north of Nagpur is coalfields and towards Kharagpur are coalfields and forests.

The question of reorganizing of railways had been pointed out by different authorities since the beginning of the present century. Some of the railways were uneconomic unit while others were unwieldy. But the main hurdle in regrouping had been two - Indian States Railways and various forms of control and ownership, State-owned and State-managed, State-owned and company-managed, and company-owned and company-managed concerns. The first hurdle was overcome in 1944 when the State took over all the company-managed railways, but still there were Indian State Railways, varying from 5 miles of the Sangli State to 1,396 miles of the Hyderabad State. On the integration of all the Indian States, the second hurdle was also removed. It is the same trend which is found in other countries. In Great Britain twenty-seven constituent companies and about a hundred subsidiary lines were regrouped into four main lines after the World War I. After the World War II, the transport

was nationalised and the Government took over all the four railways. The same trend of integration is found in France, Germany and Canada.

Before the regrouping of the railways there were 35 railway systems in India which were regrouped into 6 zonal railways. One of the principles formulated by the Railway Board was distinctly geographical in its implications: "that each railway system should be so formed as to serve as far as possible a compact region large enough to provide a headquarters organization of the highest calibre" (1). In the beginning the railways were regrouped into 6 zones - Southern, Central, Western, Northern, North Eastern and Eastern Railways. The Southern Railway was created on the 14th of April 1951, the Central and the Western Railways November 5, 1951 and the other 3 on April 14, 1952 (2). In connection with the amalgamation and redistribution of railways the Indian Railway Enquiry Committee warned as far back as 1937 that "if carried out too far, it will result in unwieldy administration" (3). This warning probably was not taken

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(1) Review of Working of the Regrouped Railways During 1951-52 & 1952-53, Delhi 1954, p.3.

(2) Ibid, p.3.

(3) Report of the Indian Railway Enquiry Committee, 1937, Simla 1937, p.142.

into consideration at the time of the regrouping of railways. Within three years of the creation of Eastern Railway it became necessary to split it into 2 zones "for operational and administrative reasons" (1). The South Eastern Railway was carved out from the Eastern Railway on the 1st of August, 1955. Hence, at present there are 7 zones.

Railways in M.P.: It was in 1867 that for the first time railway lines were opened in Madhya Pradesh from Bhusawal to Nagpur and from Jabalpur to Allahabad. Other lines were Bhusawal to Jabalpur in 1870, Itarsi to Bhopal 1882, Bengal-Nagpur Railway 1888, and Bina to Katni in 1899 (2). The Bhusawal-Nagpur line followed the Berar and Nagpur Plains, the Bhusawal-Jabalpur line was parallel to the Narmada and the Bengal-Nagpur Railway the Chattisgarh Plain. The Bhusawal-Nagpur line serves the Southwest Division of the State which is the most thickly populated division. The total mileage of railways in the State in 1904 was 1,597 miles, consisting of 1,257 miles of broad gauge, 29 miles of metre gauge and 311 miles of narrow gauge (3). In 1955,

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(1) India, op. cit., p.241.

(2) Imperial Gazetteer, C.P., op. cit., p.67.

(3) Ibid, p.67.

From Bhusawal to Nagpur passes through the cotton zone of the State and much of the development of this zone is due to the total mileage of the railways in the State was 2,596 including all gauges (1). In other words in 51 years time the increase in railway mileage was only 999 or at the rate of about 19.5 miles per year.

Madhya Pradesh is served by three zonal railways, namely, Western Railway (formerly Bombay, Baroda and Central Indian Railway), the Central Railway (formerly the Great Indian Peninsula Railway), the South Eastern Railway (originally Bengal-Nagpur Railway, then Eastern Railway). The Western Railway is a metre-gauge line which connects Khandwa with Ajmer. Only 29 miles of this railway is within Madhya Pradesh. The two main lines between Bombay and Calcutta pass through the State, one from the north and the other from the south of the Satpura plateau. As mentioned earlier the two main lines follow the relief of the State. One of the branches of the Central Railway runs parallel to the Narmada and joins Bhusawal with Jabalpur and Katni and then proceeds to Allahabad. This line from Bhusawal to Hoshangabad passes through the middle of the forests or along the fringe of forests. From Itarsi to Allahabad it taps the forest produce at many places. The other branch which goes

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(1) The Times of India Directory and Year Book, op. cit., p.696.



from Bhusawal to Nagpur passes through the cotton zone of the State and much of the development of this zone is due to this line. The South Eastern Railway between Mandla and Jabalpur taps the forest resources, north of Nagpur coalfields and towards Kharagpur coal and forest resources. The South Eastern Railway has helped in procuring foodgrains from the Chattisgarh Plain to the cotton zone to release the land for cotton growing. The Central Railway coming from Bombay bifurcates at Bhusawal. From Bhusawal one goes through Burhanpur, Khandwa, Itarsi, Narsinghpur, Jabalpur and Katni and then proceeds to Allahabad. The other from Bhusawal passes through Akola, Wardha and terminates at Nagpur. The Central Railway connects Nagpur with Bhopal via Betul and Itarsi. From Wardha a line of the Central Railway goes to Warangal passing through Warora, Chanda and Ballarshah and then proceeds to Warangal. A line of the Central Railway connects Katni, Damoh, Sagar and Bina, then proceeds to Mota (Rajasthan). There are 4 branch lines of the Central Railway connecting Bednera with Amravati, Majri with Rajur, Tadali with Ghugus Amla with Parasia. Both, main and branch lines discussed above, are broadgauge. A metre gauge line of the same railway goes from Ellichpur to Yeotmal via Murtazapur. The other

is Pulgaon to Arvi. The broad gauge lines of the South Eastern Railway in Madhya Pradesh are:

1. Nagpur-Bhandara-Gondia-Raipur-Bilaspur-Raigarh-Asansol-Calcutta
2. Raipur-Vizianagram
3. Bilaspur-Katni
4. Kanha-Ramtek
5. Tumsar Road-Tirodi
6. Anuppur-Chirmiri

The metre-gauge lines of the South Eastern Railway running through Madhya Pradesh are:

1. Jabalpur-Balaghat-Gondia-Chanda
2. Mandla-Nainpur-Seoni-Chhindwara-Parasia
3. Nagbhir-Itwari-Chhindwara

The eastern portion of the State is mostly served by the South Eastern Railway while the western portion by the Central Railway. It is worth noting that there are only two cities in the whole of the State and they are not directly connected with a railway line. Second thing to be noted is that most of the railways are in the east-west direction and north-south communication is not so developed. The main defect in the railway system of Madhya Pradesh is the lack of

branch and subsidiary lines in certain regions. There are important tracts in Madhya Pradesh which need immediate improvement in railway communication. They are Sagar, Damoh, Chhindwara, Seoni, Nimar, Betul, Amravati, Buldana, Akola, Yeotmal, Balaghat, Bilaspur and Durg. There are 4 district towns which are not on any railway line, namely, Nimar, Bastar, Surguja and Buldana. The sooner they are put on the railway map of India, the better for their economic development.

As far as districts are concerned all the districts are on one or the other railway line except Bastar. No railway line touches this district, which has an area of 15,091 square miles and which had the population of 913,746 in 1951. In the decade 1941-50, there was a proposal to connect Bastar with a railway line either from Dhamtari (metre gauge of South Eastern Railway) in the district of Raipur or from Raj-Nandgaon (broad gauge of the South Eastern Railway) in the district of Durg. But this scheme did not materialize due to financial reasons. The district of Surguja has a loop line of the South Eastern Railway at its western boundary. This line is for the exploitation of the coal mines of the Korea subdivision. There was a proposal

to extend this loop-line across the district of Surguja by connecting it with the Calcutta - Allahabad section of the South Eastern Railway somewhere in Bihar. This proposal also did not materialize due to financial reasons. The area of the district of Surguja is about 8,613 square miles and the population in 1951 was 822,041 persons. These districts of the State have large natural resources which are still untapped. If they are connected with railway lines, they should develop fast.

Five Year Plans. In the first Plan the Planning Commission observed that "the problem of rehabilitation and replacement created by the post-1930 economic depression, neglected by the conditions of the war years, and accentuated by the special features of Partition has become the major concern of the railways" (1). Hence, the main emphasis in the first Plan was on the rehabilitation of railways which included "problems of deteriorated assets and the needs of the increased traffic" (2). Besides the above objective, another important objective was "to meet new traffic arising out of implementation of the Five Year Plan,..." (3). Under

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- (1) The First Five Year Plan, op. cit., p.462.  
 (2) Ibid, p.464.  
 (3) The Progress of the Five Year Plan on Indian Railways, Ministry of Railways, Delhi 1954, p.1.

the First Five Year Plan, 2 new works were sanctioned for Madhya Pradesh in 1953-54, namely,

1. Khandwa - Hingoli (metre gauge, Central Railway)
2. Champa - Korba (broad gauge, South Eastern Railway) (1)

The Khandwa - Hingoli line will be 187 miles long. It will link the metre gauge of the Western Railway in the North with the metre gauge railway of the Central Railway in the South. This line will facilitate in the movement of food, raw materials and industrial products in the north-south direction. It will also eliminate the broad gauge - metre gauge transshipment. The work on the line is in progress and is under construction (2).

The Champa - Korba line will be about 24 miles long of the South Eastern Railway. This line will reach the right bank of the Hasdo river Korba. It will serve the new coal-fields of the area. When this railway line is completed the non-coking coal of the Korba Coalfield would be available for Railway and public consumption in the western and southern parts of India. Thus the metallurgical coal in the Bihar-Bengal Coalfield would be conserved. This will also help

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- (1) The Progress of the Five Year Plan on Indian Railways, Ministry of Railways, Delhi 1954, p.30.
  - (2) The Progress of the Five Year Plan on Indian Railways, Ministry of Railways, Delhi 1956, p.13.

indirectly in a reduction in empty haulage to the railways. This project is also under construction and the work is in progress (1).

Another project was launched in July 1955. It is also a new line, construction work is expected to be started shortly. It is Bhilai - Dhalli-Rajhara line of the South Eastern Railway. It will be about 60 miles long and will be broad gauge (2). It is to get iron ores from the mines of Dhalli-Rajhara (Durg District) to the Iron and Steel Plant to be set up under the Second Five Year Plan at Bhilai (Durg District). Under the first plan the Rourkela - Kamptee (Nagpur) line (broad gauge of the South Eastern Railway) of 437 miles long is to be double track (3). Under the same plan survey was in progress on the South Eastern Railway for broad gauge lines for Bijuri -Khairadeh and Jhilimili - Tagini. The total length will be 125 miles (4). Both will be for the exploitation of the Coalfield of Ambikapur.

For the Second Five Year Plan, the Planning Commission

(1) The Progress of the First Five Year Plan on Indian Railways, op. cit., p.12.

(2) Ibid, p.13.

(3) Ibid, p.13.

(4) Ibid, p.13.



prescribing the target remarked that "the rehabilitation and modernisation of railway assets, both mobile and immobile, have to be continued during the second plan so as to reduce the proportion of over-age stock retained in service and to facilitate the removal of speed restrictions in force over obsolete portions of the track. At the same time increases in line capacity and rolling stock have to be planned to meet the greater demand for rail transport which will arise from increased production in various sectors" (1). The policy of opening new lines has been laid down by the Planning commission. The Commission says that "owing to the limited funds available, the plan does not provide for the construction of new lines to open up parts of the country at present unserved by railways. The provision in the plan for new lines is confined to lines required for operational purposes and for the new industrial projects" (2).

The Second Five Year Plan is silent about the Bijuri - Khairadeh and Jhilimili - Tagini lines, where survey was in progress during the First Five Year Plan. Under the Second Five Year Plan two lines are to be constructed in Madhya

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(1) Second Five Year Plan, op. cit., p.463.

(2) Ibid, p.465.

(3) Ibid, p.465.

(4) Ibid, p.465.

Pradesh. They are: (1)

1. Bhilai - Dhalli-Rajhara 60 miles (broad gauge, South Eastern Railway)
2. Korba extension 5 miles (broad gauge, South Eastern Railway).

The Bhilai line is for the exploitation of the iron ores of Dhalli-Rajhara which will be brought to Bhilai Iron and Steel Works to be set up under the Second Five Year Plan. The Korba extension is for coal exploitation of the Korba Coalfield.

Under the Second Plan the lines to be doubled within Madhya Pradesh are: (2)

1. Katni - Jabalpur 57 miles Central Railway
2. Jabalpur - Itarsi 80 miles Central Railway
3. Rourkela - Nagpur 446 miles South Eastern Railway.

The major portion of the Rourkela -Nagpur line lies in Madhya Pradesh while a small portion in Orissa State. The above lines are to be made double track to decrease bottle-neck in the traffic and to increase the efficiency and speed.

Air. In the Victorian period "balloon flights" were a common feature in India. As mentioned in 'The Englishman', a bal-

(1) Second Five Year Plan, op. cit., p.473.

(2) Ibid, p.470.

loon flight was made by Joseph Lynn, in 1877 in Bombay. He attained an altitude of 7,500 ft (1). By 1909, U.S.A. and Europe recognised the importance of aeroplane for defence purposes. The importance for mail and civilian purposes was early recognised and "the credit of inaugurating the first official air mail goes to India" (2). This was in February 1911 on the occasion of the famous Allahabad Exhibition. By 1917 the problem of air transport was under the discussion of the Government of India. On the basis of the progress made in aircraft during the World War I, the Government of India decided in 1919 "to accept the principle of giving a monopoly for the carriage of mails throughout India to single transport company" (3). In the same year the Government of India signed the Paris Convention on Air Navigation to provide ground organisation and meteorological and wireless facilities. During the same year "a scheme was put forward by the Air Ministry in the U.K. for the establishment of an air service between Cairo and Karachi" (4). But this scheme did not materialise. In 1927, Sir Samuel Hoare, then Secretary of State for Air, planned "the development

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(1) Dhckney, M.R. - Air Transport in India, Bombay 1953, P.53.

(2) Ibid, p.54.

(3) Ibid, p.54.

(4) Ibid, p.54.

of Empire air routes" (1). According to that plan the dependent countries were permitted to develop their own internal service as they wished. London was linked with Karachi when the first aircraft of the England - India services was inaugurated on the 30th of March, 1929 at 10 a.m. which arrived Karachi at 8 p.m. on the 6th of April, 1929. After this linking of London with Karachi it became necessary to extend to Delhi. On 20th December, 1929, the Government "instituted a service from Karachi to Jodphur and then on to Delhi" (2). In 1933, the Indian Trans-Continental Airways was constituted "mainly with a view to secure India's participation in the Trans-India service scheme" (3). It was a joint enterprise of the Imperial Airways and the Indian National Airways (established in the same year) and the Government of India. The next important phase was the announcement of the introduction of Empire Air Mail Services in December, 1934. The scheme was inaugurated in June, 1937. This was the mainspring in the expansion of the air services in India and in other participating countries (4). The advantages accrued under this

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(1) Dickney, M.R. - Air Transport in India, Bombay 1953, p.56.

(2) Ibid, p.57.

(3) Ibid, p.58.

(4) Ibid, p.64.

scheme were to be able to introduce larger aircraft, to develop passenger and freight traffic and to speed up of the air mails between India and the Empire countries. It will be seen that during the period between 1929 and 1938, "the external services were thus mainly engaged to carrying the mails from and to India, passenger traffic being of meagre proportion" (1).

To develop faster services in India, the Government of India negotiated with some of the business houses of India in 1931-32. As a result of these negotiations, two companies were formed - Tata Air Lines and the Indian National Airways. The first flight of the Tata Air Lines was inaugurated on the 15th of October 1932, and of the National Airways in May, 1933. These two companies "were thus started as auxiliaries to the operation of Imperial Airways" (2). At the same time the Indian Trans-Continental Airways had been a subsidiary of the Imperial Airways. In 1936, another company came on the scene with the main object of "the promotion of passenger traffic" (3). It was Air Services of India. For airlines the period of 1933-39 was one of

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(1) Dickney, M.R. - op. cit., p.64.

(2) Ibid, p. 77 & 78.

(3) Ibid, p.78.

experiment and the operations were carried out at the risk of having insufficient traffic. During this period they suffered certain disadvantages, viz., absence of all-weather ground organisation, night flying facilities, suspension of certain routes due to monsoon and shortage of technical hands. The result had been that the air companies could not make maximum utilization of their resources. From the above description it will be seen that the progress made in the civil aviation before the World War II (between 1932 and 39) "was, doubtless, slow, but it was steady" (1).

With the spreading of the war in the East, Air Services of India had to give up its commercial activities in October 1940 and the resources were "utilised for training of personnel required by the Indian Force" (2). The other two companies, "the Tata Airlines and the Indian National Airways were entrusted with the operation of services in different parts of the country in accordance with the requirements of the Defence Services" (3). It is to be noted that during the war period "the remuneration paid by Government to these companies for the various services rendered by them during

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(1) Report of the Air Transport Inquiry Committee 1950, Delhi 1950, p.6.

(2) Dickney, op. cit., p.82.

(3) Ibid, p.82.



the War put them in a financially sound position at the end of the War. They were running air services which were fairly remunerative and had built up an amount of goodwill and support amongst the travelling public. They had also gained experience in the handling of more modern aircraft and had the opportunity to train and employ a good number of technical personnel" (1).

A post-war plan was prepared by Sir Frederic Tymms, the then Director of Civil Aviation, Government of India. It was in 1944 - even before the termination of the hostilities - that Sir Frederic submitted his plan to the Government of India. According to that Plan there was "the prime need of establishing a system of air services linking the principal commercial and administrative centres in India and connecting with the principal neighboring countries" (2). He suggested three services, namely,

1. Trunk Air Services to connect principal commercial and administrative centres within India and to link India with the principal neighbouring countries.

2. Essential Links between Trunk Air Services, and

3. Local Air Services; services which are of local

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(1) Report of the Air Transport Inquiry Committee, op. cit. p. 7.  
(2) Dhckney, op. cit., p. 84.

interest and importance. (1)

This plan was accepted by the Reconstruction Policy Committee "and in May, 1945, the Government announced that it would be their policy to permit development and operation of air transport services, internal and external, by a limited number of sound and reliable commercial organisations, with their own capital and operated under normal commercial principles of risk of losses and prospects of gain" (2). Further, the companies would be subject to the grant of licence by the Government of India and the Government might give financial assistance in certain cases. To grant licences, Air Transport Licensing Board was created by the Government of India in October 1946. This action of the Government "opened a new chapter in the development of air transport in India" (3). Between 1946 and 1948, within a short period of about 2 years, the Air Transport Licensing Board granted provisional licences to 11 companies, including the three old ones.

In spite of all encouragements and concessions given by the Government of India, all was not well with all these

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(1) Report of the Air Transport Inquiry Committee, op.cit., p.8.

(2) Dhckney, op. cit., p.85.

(3) Ibid, p.85.

air companies financially. And "some of the companies went into liquidation. All requested the Government for assistance" (1). Under the circumstances the Government of India set up the Air Transport Inquiry Committee in 1950 under the chairmanship of Mr. Justice G.S. Rajadhyaksha to investigate the working of the air companies and to recommend ways and means for the development of the air transport (2). The Committee reviewed the whole situation and came to the conclusion that there was "no justification for nationalization" (3). Further it advised a review of the case after 5 years if the situation did not improve. However, owing to the continued deterioration of the financial conditions of the air companies, the issue of nationalization came to the forefront in 1952. In 1952, the air companies and the Civil Aviation Department recommended the replacement of the old aircraft at the earliest opportunity. The Planning Commission reviewed the whole situation in the light of the request made by the air companies "for a loan of Rs. 7 crores (Rs. 70 million) for replacing their old aircraft by new machines" (4). The Commission after giving due

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(1) Nationalization of Air Transport, Ministry of Communications, Delhi n.d., p.17.

(2) Report of the Air Transport Inquiry Committee, op. cit., pp.1 and 2.

(3) Ibid, p.186.

(4) Bhatnagar, op. cit., p.410.

consideration rejected the recommendation made by the Air Transport Inquiry Committee of 1950 "that the existence of a large number of air companies was not in the interests of the country" (1).

The companies were to be merged into a state-owned enterprise with the permission to the existing companies to participate in the new adventure. Further those companies that did not want to participate in the new enterprise would be paid compensation. On the basis of the recommendations of the Planning Commission the Air Corporations Act, 1953, was passed by the Indian Parliament and thus air transport was nationalised. According to this Act, there were to be two corporations - Air-India International Corporation for international services of long distances and the Indian Airlines Corporation for internal services and for services to neighbouring countries. On June 30, 1953, just before the enforcement of the Air Corporation Act, 1953, there were 14 Indian companies (2). The Act came into force on August 1, 1953, and with it air transport became nationalised.

Air Transport in Madhya Pradesh. The main reason for

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(1) Nationalization of Air Transport, op. cit., p.19.

(2) Times of India Book, op. cit., p.228.

Nagpur becoming an important aerodrome is its central position in the subcontinent of India. The other is that it is on the junction of railways connecting Madras with Delhi and Bombay with Calcutta. Its importance is not due to local causes, but to its being situated at the junction of railways and air routes. Its elevation is 1,022 ft. above M.S.L. and is situated in a plain. It may be mentioned here that not much freight is carried by aeroplanes in India and it is mainly for human and partly for postal transport. Situated more or less at the centre of India and at the crossroads of Delhi to Madras, Delhi to Trivandrum and Bombay to Calcutta, the air port of Nagpur is of very great importance. One day the Nagpur port may become one of the most important international port of world due to its favourable geographical position and also for its excellent visibility almost throughout the year as is envisaged in the table given overleaf, which is based on observations from 1881 to 1940. (1)

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(1) Climatological Table of Observations in India, Delhi 1953, pp. 283 and 284.

Table No.80. Showing climatological date of Nagpur (All are annual mean).

Pressure	Air Temperature						Cloud Amount	Rain-fall		Weather Phenomena	No.of days with wind force	C l o u d		Visibility	
												No. of days with cloud amount (All clouds)	No.of days with low cloud amount		No.of days with visibility
Mean at Station level	Mean Dry Bulb	Mean Wet Bulb	Mean of Daily Max.	Mean of Daily Min.	Mean of Highest in the month	Mean of Lowest in the month	All Clouds	Low Clouds	Annual Mean No. of rainy days	Mean wind speed	Precepitation ".01" or more Thunder Hail Dust Storm Squall Fog	8 or more 4 - 7 1 - 3 0	0 3 6 9 10 overcast	0 3 6 9 10 Fog 10	Up to 1,100 yds. 1,100 yds. to 2.5 miles 2.5 to 6.25 miles 6.25 to 12.5 miles over 12.5 miles
mb.	°F	°F	°F	°F	°F	°F	Tenths of 32° F	in.	in.	m.p.h.					
974.4	75.6	65.9	92.1	70.1	114.2	46.0	3.9 1.7	49.29	62.2	4.9	97 48 0.6 0.9 0.6 0.4	0 17 29 3 55	84 76 56 95 54	245 47 38 14 21 0	0.2 15 55 135 160
970.7	87.6	70.3					5.5 2.6					0 14 29 5 56	50 66 77 114 58	165 79 74 26 21 0	0.2 16 63 118 168

Note . Hour I stands for 8 hours. Indian Standard Time (i.e. 0230 G.M.T.) Hour II for 17 hours Indian Summer Time or 1130 G.M.T.)

From the above table and from its geographical position it will be seen that Nagpur is in a most favourable position as an aerodrome.



The air companies that were granted provisional or temporary licences by the Air Transport Licensing Board up to 30th June 1949 to operate through M.P.

1. Air India

Bombay - Nagpur - Calcutta

2. Deccan Airways

Delhi - Bhopal - Nagpur - Hyderabad - Madras

3. Mistri Airways (later changed to Indian Overseas Airlines)

a) Bombay - Nagpur - Calcutta

b) Nagpur - Jabalpur - Allahabad - Kanpur - Lucknow

c) Nagpur - Hyderabad - Bangalore - Madras

d) Delhi - Nagpur - Madras

4. Jupiter Airways

Madras - Visakhapatnam - Nagpur - Agra - Delhi (1).

In 1953, at the time of their taken over by the corporation, the companies operating through Madhya Pradesh were:

1. Airways (India) Ltd., Calcutta

Calcutta - Nagpur - Bombay

Daily service.

2. Deccan Airways Ltd., Begumpet

a) Madras - Hyderabad - Nagpur - Delhi Daily Service.

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(1) Report of the Air Transport Inquiry Committee 1950, op. cit., p.257.

- b) Delhi - Nagpur - Madras      Daily service.
- c) Bombay - Nagpur - Calcutta (1). Daily service.

In India a very negligible quantity of freight is carried by air. It is wholly for passenger traffic. The Government of India's objective is to connect all the headquarters of various states and important towns with each other. The above routes reflect the same objective. It will be seen that till the end of June 1949, 8 licences were issued to various companies to operate through Nagpur, but in July 1953, only 4 routes were operated. At present Nagpur is not on the international route and therefore there is no International Aerodrome in the State. Since Nagpur is an air junction, it is classed as a Major Aerodrome. The Minor Aerodromes in Madhya Pradesh are Akola, Bilaspur, Jabalpur, Khandwa and Raipur. There is no aerodrome of the Intermediate class in the State. In other words, there are one Major and 5 Minor Aerodromes in the State.

Five Year Plans. The First Five Year Plan makes substantial contribution for the development of air transport in India. During the first two years of the Plan,

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(1) Times of India Year Book, op. cit., p.229.

the capital expenditure allotted was Rs. 18.5 million per year, out of which Rs. 15 million per year was for work, and the rest for equipment. During the remaining 3 years of the Plan period the allotment was Rs. 96.7 million, 70% to be spent on work, and the balance for technical equipment (1). Besides the above allotment the provision of Rs. 95 million was made for 13 new aircraft to be purchased and to pay compensation to air companies to purchase their assets for the new corporations (2). Under the First Plan 9 new aerodromes were constructed before 1956 and two were expected to be completed by the end of 1956 (3). The Second Five Year Plan includes construction of new aerodromes, equipment of various types, training, education and research (4). The total expenditure during the second Plan period on the above items would be about Rs. 125 million. Under the second Plan "8 new aerodromes and glider-dromes would be constructed. It would be in pursuance of the general objective of providing aerodromes in the capitals of all States and in other important towns throughout the country" (5). For the two corporations (Indian Airlines

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(1) First Five Year Plan, op. cit., pp. 476 & 477.

(2) Ibid, p. 478.

(3) Second Five Year Plan, op. cit., p. 488. 34 of 1930.

(4) Ibid, p. 488.

(5) Ibid, p. 488.

Corporation and Air India International) a sum of Rs. 305 million has been provided for expansion and modernization of their fleet (1). During the second plan period 10 new gliding centres and 5 new flying clubs will be opened in India. (2).

It is to be noted that under the States Reorganisation Act, 1956, No.37 of 1956, the State of Madhya Pradesh has been reconstituted. The district of Berar along with the districts of Nagpur, Wardha, Bhandara and Chanda have gone over to the Bombay State and the Bhopal State with Madhya Bharat and Vindhya Pradesh have come over to Madhya Pradesh (3). The consequences of this reshuffle as far as air transport in Madhya Pradesh is concerned, is that it has lost the important port of Nagpur. Henceforth, Madhya Pradesh is not so important as its position was previous to the reorganisation. Bhopal Air Port has been added.

Inland waterways. It is irrelevant to discuss the past history of inland navigation of the subcontinent of India in context of the navigation in Madhya Pradesh. There are no records to show that there had been navigation in Madhya

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(1) Second Five Year Plan, op. cit., p.489.

(2) Ibid, p.489.

(3) The States Reorganisation Act, 1956 (No.37 of 1956), Delhi 1956, p.6.

Pradesh as is claimed in the rivers of Northern India and even in some rivers of South India. Spate is of the opinion that "The rivers of the Peninsula are for the most part almost useless for navigation" (1). This may be due to the rugged nature of the country. Most of the rivers of the State become shallow in the dry season, becoming turbulent during the rainy season. All the rivers are rain fed with the result that they become turbulent during the rainy season and shallow in the dry season. The annual average rainfall over the Satpuras and Vindhya (the sources of many of the rivers of the State) is between 55 and 65 inches. The catchment areas of the rivers have even less rainfall. Being a tropical country, the evaporation is great resulting in decreasing the amount of water during the hot season. Still many of these rivers can be made navigable if locks and weirs are constructed and storage facilities are made available. These are possible only if multi-purpose projects are taken up. Locks and weirs are also other causes. If there had been any navigation practised in the State it would have been in favoured parts of some of the rivers for short distances by small country boats. The two Imperial Gazetteers of the

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(1) Spate, op. cit., p.318.

Central Provinces and Berar are silent on this point. There are only some references in only two District Gazetteers - Chanda District Gazetteer and Hoshangabad District Gazetteer. From these two gazetteers it can be concluded that the Godawari and the Narmada are navigable. There had been a Godawari Navigation Scheme submitted to the Government of India in 1863 which was accepted. The work on the scheme was started in 1865-66. In 1871-72, the work was given up under the order of the Government (1). There are various references regarding the river navigation in the Chanda District Gazetteer. The other gazetteer in which there is reference to river navigation is found in that of Hoshangabad District. According to this gazetteer there was a plan to make Narmada navigable within the district limit. But this scheme was rejected by the Government after making a careful survey. The gazetteer also mentions that there was some navigation in the Narmada in the past (2). If the Godawari scheme is taken up once more it will greatly help in the development of the Chanda district.

In the opinion of the Provincial Industries Committee

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- (1) Central Provinces District Gazetteers, Chanda District, Calcutta 1908, pp.257-259.
  - (2) Central Provinces District Gazetteer, Hoshangabad District, Calcutta 1908, p.199.



the Godavari, the Narmada, the Wardha, the Wainganga and the Painganga have possibilities for the development of navigation (1). The committee recommended that high priority should be given to the schemes of navigation of the Godavari and the Wardha and their tributaries (2). The National Planning Committee on Transport says that "Investigations are in progress to assess the value of these rivers for multipurpose development including navigation" (3).

Besides other factors, such as railway competition, one very important reason for this drawback in the inland navigation had been that it was a provincial subject. The Central Government realized this drawback and has taken over the inland waterways and "has assigned the responsibility for surveys, planning and development of water transport to the Central Waterpower, Irrigation and Navigation Commission (CWINC)" (4). Exactly the same step was taken by the U.S. Federal Government in 1909. The CWINC has taken up the work of investigation on various rivers of India. According to the investigations made by the CWINC "it is feasible to connect the western and eastern coasts of India

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(1) Report of the Provincial Industries Committee, op.cit., pp.100-103.

(2) Ibid, p.126.

(3) Transport, National Planning Committee, op.cit., p.246.

(4) Water Transport in India, CWINC, Delhi 1951, p.21.

by the construction of suitable dams, weirs and locks on the Narmada, the Rehand, the Son and the Ganga" (1). The commission is also studying the Narmada and Tapi multi-purpose projects which include navigation also. (2). It is desirable that CWINC should take up the study of these rivers to find out how far they can be utilized for navigational purposes. The Godawari, the Pranrita and the Wardha rivers can be made navigable throughout their courses and would then make a waterway from the cotton-growing and industrially developed district of Nagpur to the sea, if the three Barriers are removed. (The First Barrier is about 132 miles above Cocanada, the Second is at the junction of the Indravati and Godawari and the Third is at Dewalmari in the Ahiri Zamindari.) In 1854, it was decided to remove these Barriers; "but in 1871, after very considerable sums had been expended, the project was finally abandoned as impracticable" (3). The Wainganga can be used for navigation between Bagh (Balaghat district) and Garchiroli (Chanda district) and then beyond Chinchgondi. Navigation is difficult between Garchiroli and Chinchgondi due to barriers.

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- (1) Water Transport in India, CWINC, Delhi 1951, p.23.  
 (2) Bhatnagar, op. cit., p.347.  
 (3) C. P. Gazetteer, 1908, p.152.

The Wardha river is navigable beyond Soit (Chanda district), especially after its joining the Painganga. At Soit there is waterfall. The Soit passes through a narrow rocky channel and is unfit for navigation. Within the State the Narmada, on account of its rapid floods and rocky course "is useless for navigation except by country boats between August and February....." (1). The fall in the course of the Narmada between Jabalpur and Hoshangabad is 340 ft. The bed of the Tapi is crossed at several places by ridges of rocks and is, therefore, not navigable within the State.

The Son passes through the forest area, rich in bamboos and timber. The Narmada catchment area includes the teak forests and the wheat zone of the State and the Jabalpur minerals. The same is true for the Tapi catchment area. The Godswari, the Pranhita and the Wardha will help in the exploitation of the cotton and coal and limestone. The Mahanadi catchment will help in the exploitation of the rice, forest and some mineral resources of the State. There is a great necessity to harness the water of these rivers for irrigation also. India is a tropical country with most of the rain occurring in a few months of the year. During hot season

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(1) C. P. Gazetteer, 1908, p.147.

when water is most needed it is dry. Shortage of water is responsible for low yield of foodgrains. Where two crops can be grown only one is raised but for water. In M. P. only one rice crop is grown because of the water shortage. The yield of cotton (and for that matter of all grains) is low as it is rain fed. The yield of irrigated cotton is much higher, hence, if irrigation facilities are available, it can be increased. The irrigation projects, if linked with canals, would give a major reason for opening up water navigation.

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1. Indian Yearbook, Vol. 11, No. 1, 1967, Kanpur, n.d. p.46.
  2. Ibid., p.46.
  3. Royal Commission on Agriculture, Report, Bombay, 1972, p.46.
  4. Ibid., p.46.

### Appendix I

Statistics. Indian statistics are neither complete, nor accurate nor reliable. Since agriculture is the most important it is taken first. The defects pointed out by the F.A.O. Census Committee (April 1949) are: "1) gaps in coverage, 2) lack of uniformity in definition and classification, 3) defects of tabulation, 4) defects of primary reporting agency, 5) defects of supervision and checking, and 6) defects in planning and coordination". (1) Further, "as a result of control over procurement of foodgrains, production and distribution of agricultural commodities, there is a definite incentive for the patwaris (petty village official) to report biased estimates." (2) To evade Agricultural Income Tax Act is another incentive to submitting false returns. The statistics of crop area "are more guesses and not infrequently demonstrably absurd guesses." (3) Besides, "the accuracy and completeness of the statistics are still influenced by administrative considerations." (4) Normal yield statistics are also not reliable as "the methods adopted in carrying them out, and the agency employed in conducting them have all be subject of criticism in the

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1. Indian Farming, Vol. XI, No. 1, January 1950, Kanpur, n.d. p.48.
  2. Ibid., p.49.
  3. Royal Commission on Agriculture in India, Report, Bombay, 1928, p.605.
  4. Ibid, p.600.

past." (1) The Central Minister for Food and Agriculture also made adverse comments on the reliability of the data supplied by the patwaris at the convocation of the Indian Council of Agricultural Research in September 1950. (2)

Reporting and Non-Reporting areas form another problem. Large areas are "situated in the former princely States where, due to the absence of survey and village revenue agency, no regular statistics are collected." (3) "The figures for the different years," says the Guide, "are not strictly comparable owing to the gradual extension of reporting areas particularly after 1947-48." (4)

Figures on the same subject supplied by different Government Departments differ from each other. The geographical area of Madhya Pradesh, according to the Surveyor General of India, is 83,375,000 acres and according to village papers (State Revenue Department) 83,104,000 acres - a difference of 271,000 acres. (5) Which figure should be accepted for agricultural planning is a perplexing question.

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1. Royal Commission on Agriculture in India, Report, Bombay 1928, p.606.
  2. Towards Land Transformation, Part I (Evolution of Agricultural Policy), Delhi 1951, pp.138 and 139.
  3. Guide to Current Agricultural Statistics, No Imprint, n.d., p.2.
  4. Guide to Current Agricultural Statistics, op.cit. p.7.
  5. Indian Agricultural Statistics, 1949-50, Vol. II, Delhi 1955, p.7.



Besides, the "allowances made for areas covered by water, buildings, roads, etc. are different in the two cases."(1) The Central Food and Agriculture Minister said that "it had been often observed that figures given by the Food Department were different from those given by the Agriculture Department on the same subject."(2) The official estimate of foodgrain production in India for the current session (1956-57) is 68.59 million tons - a record production. Against this record production, the Food Department is importing 3.5 million tons of foodgrains.(3) The present population of India, if calculated at the decennial growth rate of 12.5%, is to be 388 million. Allowing 16 oz. of food per adult and 12oz. per child, India needs only 54 million tons of foodgrains. Thus there should be 14.59 million tons surplus, if the Agriculture Department is correct. Obviously the estimate is wrong as "the principal defect of the official system of yield

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- (1) Guide to Current Agricultural Statistics, No Imprint, n.d., pp 2 and 3.
  - (2) Towards Land Transformation Part II (Agricultural Extension Seminar) Delhi 1952, p. 1.
  - (3) The Manchester Guardian, Tuesday, August 20, 1957, Manchester, p. 7.

(2) Guide to Current Agricultural Statistics, pp. 15, p. 3.

estimation is the absence of an objective procedure and of a criterion for judging the magnitude of error inherent in it. There is no provision, even at the harvest stage, of replacing the earlier forecast by an objective estimation of yield through measurement of actual produce."(1)

The basis of agricultural classification and its definition have been changed several times. The classification used till 1949-50, "affords only a broad outline of land utilization in the country and does not give a clear picture of the actual area under different categories of land use, so very necessary for agricultural planning."(2) The percentage of population engaged in agriculture gradually increased from 61.1 in 1891 to 73.0 in 1921 at every Census. The basis of classification being changed in 1931, decreased it to 65.6 p.c. "The present decline", says Anstey, "in the numbers dependent upon agricultural and pastoral pursuits between 1921 and 1931 is illusory ... to be accounted for by a change in classification,

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- (1) Sample Surveys for the Estimation of Yield of Food Crops, 1951, I.C.A.R. No Imprint, n.d. pp 5 and 6.  
 (2) Guide to Current Agricultural Statistics, op. cit., p. 3.

not of occupation ... The percentage of the population engaged in agricultural and pastoral pursuits hardly changed between 1921 and 1931."(1) From the classification "it is very difficult to make out clearly what 'not Available' really means."(2) Also the area under culturable waste does not represent the area which is really cultivable, a large part of which, it may not be possible to bring under cultivation except at a very high cost."(3)

The Planning Commission pointed out "the inadequacy of such data and the need for their improvement..."

When formulating the First Plan(4) Spate says that "the agricultural Statistics are reliable enough for regional or crop comparison, and as evidence of trend, and otherwise it is sufficient to bear in mind that they are indices rather than absolute statement."(5)

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- (1) Anstey, U. - Economic Development in India, London 1949 p. 61.
  - (2) Spate, O.H.K. - India and Pakistan, London 1954, p. 201.
  - (3) Guide to Current Agricultural Statistics, op. cit., p. 5.
  - (4) Second Five Year Plan, Delhi 1956, p. 280.
  - (5) Spate, loc. cit., p. 201.

The Report on the Marketing of Cattle in India says "that livestock enumeration in India has not yet attained any desirable standard of accuracy."(1) Realising the handicap the Government of India Planning Commission drew the "Attention to the inadequacy of such data and the need for their improvement was drawn in the First Five Year Plan."(2) "Data relating to livestock," further the Commission observes, "numbers and livestock products and fisheries are inadequate and defective."(3) Hence, a caution when studying this problem.

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- (1) Report on the Marketing of Cattle in India, Bombay 1956, p. 5.  
(2) Second Five Year Plan, Delhi 1956, p. 280.  
(3) Ibid., p. 280.

## Appendix II

Changes in boundaries and area. There have been changes in the boundaries and area of the State from time to time. From the description given earlier it is obvious that the State was formed in 1861 as the Central Provinces. Since then there have been additions and subtractions in the territory. It will also be noted from the table given below that the area did not remain the same at the time of two censuses. Besides additions and subtractions the other causes for changes in area were the corrections of measurement, re-calculation of areas, accuracy of the survey operations and the application of more scientific way of survey.

1. Census of India 1901, Vol. V, Part I Report, Allahabad 1901, p.11 and Census of India 1901, Vol. V, Part I Report, Allahabad 1901, p.11.
2. Census of India 1901, Vol. V, Part I Report, Allahabad 1901, p.11 and Census of India 1901, Vol. V, Part I Report, Allahabad 1901, p.11.
3. Census of India 1901, Vol. V, Part I Report, Allahabad 1901, p.11 and Census of India 1901, Vol. V, Part I Report, Allahabad 1901, p.11.
4. Census of India 1901, Vol. V, Part I Report, Allahabad 1901, p.11 and Census of India 1901, Vol. V, Part I Report, Allahabad 1901, p.11.
5. Census of India 1901, Vol. V, Part I Report, Allahabad 1901, p.11 and Census of India 1901, Vol. V, Part I Report, Allahabad 1901, p.11.
6. Census of India 1901, Vol. V, Part I Report, Allahabad 1901, p.11 and Census of India 1901, Vol. V, Part I Report, Allahabad 1901, p.11.
7. Ibid, p.11.
8. Census of India 1901, Vol. V, Part I Report, Allahabad 1901, p.11 and Census of India 1901, Vol. V, Part I Report, Allahabad 1901, p.11.
9. Census of India 1901, Vol. V, Part I Report, Allahabad 1901, p.11 and Census of India 1901, Vol. V, Part I Report, Allahabad 1901, p.11.

Table No. 81 showing the area of the State at the time of censuses from 1881-1951

<u>Census Year</u>	<u>Area (Square Miles)</u>	<u>Remarks, if any</u>
1881	130,990 (1)	
1891	133,654 (2)	
1901	133,604 (3)	
1911	130,997 (4)	
1921	131,052 (5)	
1931	131,095 (6)	133,050 Square miles according to Surveyor-General's figures (7)
1941	130,323 (8)	
1951	130,272 (9)	

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1. Census of the C.P. 1881, Vol. II Report, Bombay 1883, p.1. and Report on the Census of Berar 1881, Bombay 1882, p.28.
  2. Census of India 1891, Vol. XI, Part I Report C.P. and Feudatories, Calcutta 1893, p.12 and Census of India 1891, Vol. VI, Berar, or the Hyderabad Assigned Districts, Calcutta 1892, p.iii.
  3. Census of India 1901, Vol. VIII, Part I Report, Berar, Allahabad 1902, p.11 and Census of India 1901, Vol. XIII, Part I Report, C.P., Nagpur 1902, p.9.
  4. Census of India 1911, Vol. X, Part I Report, C.P. and Berar, Calcutta 1912, p.5.
  5. Census of India 1921, Vol. XI, Part I Report, C.P. and Berar, Nagpur 1923, p.2.
  6. Census of India 1931, Vol. XII, Part I Report, C.P. and Berar, Nagpur 1933, p.4.
  7. Ibid, p.65.
  8. Census of India 1941, Vol. VIII, Tables, C.P. and Berar, Simla 1942, p.2 and Census of India 1941, Vol. VII, Tables, Bihar, Simla 1942, p.2.
  9. Census of India 1951, Vol. VII, Part I A, Report, Madhya Pradesh, Nagpur, 1953, p.1.



During the decade ending the census year 1891, there had been an increase of 2,664 square miles in the area of the State, out of which 2,657 square miles were in the Central Provinces and only 7 square miles in Berar. The increase of 2,657 square miles in the Central Provinces were on account of "the corrected area statement". (1) The same is the reason for the increase of area in Berar. (2) In 1901, there was a decrease of area which is due to revision and correction of survey work. (3) In 1911, there was a decrease of area by 2,607 square miles. There were certain factors responsible for this decrease. They were (a) in 1905 major part of the district of Sambalpur was transferred to Bengal, (b) part of the Chanda district transferred to Madras, and (c) the States of Bamra, Rairakhol, Sonpur, Patna and Kalahandi were exchanged with Bengal in 1905 for the States of Surguja, Jashpur, Udaipur, Korea and Changbhakhar, resulting a loss of area to Madhya Pradesh. (4) In 1921, the area given by the Census Report

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1. C.P. Census 1891, op.cit., p.12.
  2. Berar Census 1891, op.cit., p.iii.
  3. C.P. Census 1901, op.cit., p.1 and Berar Census 1901, op.cit., p.11.
  4. C.P. and Berar Census 1911, op.cit., pp. 2 and 3.
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1. C.P. and Berar Census 1921, op.cit., p.1.
2. C.P. and Berar Census 1921, op.cit., p.1.

is greater by 55 square miles than the figure of 1911. The Report, though it admits that there were no changes in the boundary of the State, gives no explanation for this difference. (1) In the Census Report of 1931 two figures are given, one on which the Provincial calculation was made and the other supplied by the Surveyor-General of India. There is a difference of no less than 1,955 square miles between the figures of the two sources. It "is due to recalculation of forest areas, and to the accuracy of the Survey operations ..." (2) In 1941, there was a decrease in the area due to the transfer of certain areas of the districts of Raipur and Bilaspur to Orissa Province when the new Province was formed under the Government of India Act 1935. At the time of the Census of 1951 the area was 130,272 square miles. There is a slight difference over the figures of 1941, but this is due to corrections in Survey work.

The State and its boundaries. The State of Madhya Pradesh (or Central Provinces and Berar), as its name indicates is situated at the centre of the Sub-Continent of India. It is first as regards area and sixth in population among the major States of the Indian Union, as is evident from the tables

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1. C.P. and Berar Census 1921, op.cit., p.1.
  2. C.P. and Berar Census 1931, op.cit., p.1.

given below. (1)

Table No. 82 showing the area of the major States of India according to the Census of 1951

<u>State</u>	<u>Area (in acres)</u>
1. Madhya Pradesh	83,375,424
2. Rajasthan	83,353,280
3. Madras	81,785,600
4. Uttar Pradesh	72,596,672
5. Bombay	71,213,440
6. Assam	54,407,872
7. Bihar	45,011,072
8. Orissa	38,486,976
9. Punjab	23,922,368
10. West Bengal	19,696,192

Table No. 83 showing the population of major States of India according to the Census of India 1951

<u>State</u>	<u>Population</u>
1. Uttar Pradesh	63,215,742
2. Madras	57,016,002
3. Bihar	40,225,947
4. Bombay	35,956,150
5. West Bengal	24,810,308
6. Madhya Pradesh	21,247,533
7. Rajasthan	15,290,797
8. Orissa	14,645,946
9. Punjab	12,390,123
10. Assam	9,043,707

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1. Census of India, 1951, Vol. I Part IB, India, Delhi 1955, pp.16-21.

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